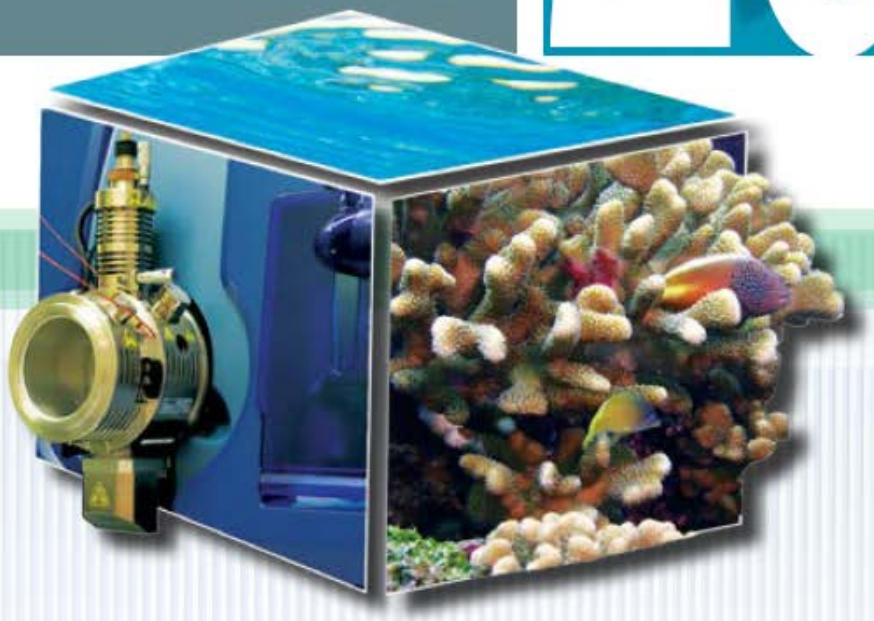
ANNUAL REPORT 2013 年度報告



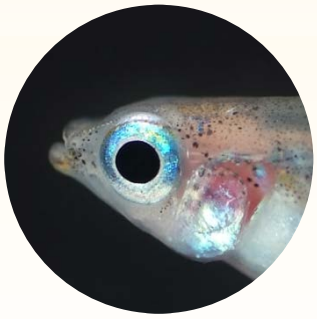
海洋污染國家重點實驗室
State Key Laboratory in Marine Pollution

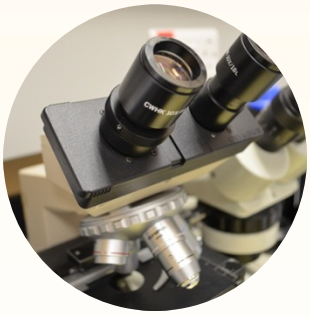
Envisions a solid base where coordinated and long-term research can be conducted to tackle marine pollution problems.

希望通過堅實的長期協作研究平台以解決海洋污染問題。

The mission of the SKLMP is to protect the marine environment of Hong Kong and South China by identifying major threats such as algal toxins and contaminants of emerging environmental concern, and developing tools and technologies to address and solve these problems.

海洋污染國家重點實驗室的使命為通過明確威脅海洋環境的主要問題，如藻毒素和新興環境污染物等，並發展相關設備和技術致力於這些問題的解決，以保護香港和華南地區的海洋環境安全。





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A Message from the Director
主任致辭

How time flies. It is the fifth year since the establishment of the State Key Laboratory in Marine Pollution (SKLMP). The year 2013 was an extraordinary year for SKLMP. Through the efforts of all SKLMP members, as well as our local and overseas friends and collaborators, we have jointly overcome many obstacles and challenges to make new and outstanding achievements. The competitiveness and influence of SKLMP have gradually increased both locally and internationally. I would like to express my heartfelt gratitude to all who have contributed their blood, sweat and tears to this hard-earned success. The year 2014 will be a promising and the most important year to all of us since SKLMP will be assessed in the first 5-year cycle of the monitoring procedure set out by the Ministry of Science and Technology of China (MOST).

As measured by research grants and output, the level of scientific research of SKLMP has steadily increased in 2013. A total of 31 research grants (including 4 research funds from Hong Kong government, 18 research funds from the University Grants Committee and 9 research grants from mainland China) of more than HK$34.8 million has been successfully secured. There were 76 SCI papers published in international refereed journals (an 85% increase compared to 2012) with SKLMP as an affiliation. Among these, 49% of the publications arose from collaborations among two or more SKLMP members, while 14% were generated from collaborations among institutions. These results reflect a successful structure within which SKLMP members are able to team up to conduct innovative research in accordance with specific research themes.

This year, the Innovation and Technology Commission (ITF) has increased the amount of funding support to SKLMP from a ceiling of HK$2 million each year to HK$5 million each year. In order to encourage SKLMP members to conduct cutting-edge and innovative research, 60% of the funding from ITF has been used to set up not only the SKLMP Seed Collaborative Research Fund (SCRF), the CityU Internal Research Fellowship Program (RFP) and the CityU Internal Research Fund (IRF), but also the newly launched Theme-based Project (TBP). The internal funding scheme aims to provide an additional source of funding to SKLMP members to generate preliminary data on a potential large-scale project to increase their capacity for successful application for external grants, creating a supportive and stimulating atmosphere for members to perform frontier research in marine pollution.

Since the establishment of SKLMP in 2009, the first Academic Committee has worked on a strategic plan to construct, develop, and promote the work of the Laboratory. Their insight and vision has built a solid foundation to guide the growth and development of SKLMP. Making full use of the Hong Kong's international connectivity and insisting on the “One country, two systems” principle, top researchers from mainland China, Hong Kong, Macau and Taiwan, as well as renowned scientists from around the world have come together to build SKLMP into an international research hub for marine environmental science. On behalf of my SKLMP colleagues, I would like to convey my greatest respect and sincere gratitude to all of the members of the first Academic Committee who have served and provided unreserved support to SKLMP over the past five years. We are pleased that the second Academic Committee (comprising Prof Ji-lan Su, Academician of the Chinese Academic Science (CAS) and the Chairman of the Shenzhen Marine Research and Technology (SMART) Consortium, six Academicians of CAS and seven scholars from mainland China) of SKLMP will be established to build on the work of the first committee, to oversee the direction and further development of the Laboratory and to strengthen the research capacities of SKLMP in the next five years. An International Advisory Committee including many of the members of the first Academic Committee will be inaugurated to expand and advance the exchange of ideas and research collaboration with international world-class scholars. Under the advice and guidance of both the second Academic Committee and the International Advisory Committee, our strategic plan will be further refined to improve the research capacity, competitiveness and influence of SKLMP in mainland China and abroad.

With the increasing capacity of SKLMP for attracting top scientists as members, a multidisciplinary research team of 39 members with expertise in 11 research areas has been formed to conduct cutting-edge research on marine pollution. Their participation has added distinction to SKLMP and has acted as a driving force to further motivate collaborative and interdisciplinary studies in new research areas.

On the laboratory management front, SKLMP and our partner State Key Laboratory, the State Key Laboratory of Marine Environmental Science at Xiamen University (MEL) have jointly established the "Centre of Major Equipment and Technology (COMET)" to strengthen management and facilitate the sharing of major instruments among members. The COMET not only boosts the utilization efficiency of major equipment, but also enhances the quality of our technical support teams. The success of COMET has contributed to MEL being ranked first in the Assessment on Open Information and Sharing of Scientific and Technical Resource for National Key Laboratories undertaken by the Institute of Scientific and Technical Information of China. Indeed, the success of MEL in the sharing of laboratory resources and information has set a good example for SKLMP.

The Research Centre for the Oceans and Human Health (H2O), which is a satellite division of SKLMP in mainland China, was officially opened on 11th October 2013. H2O has received 8 research grants, including 2 from the National Natural Science Foundation of China (NSFC) and 6 Shenzhen Municipal Science and Technology Projects this year. In total, 20 projects have been successfully funded via H2O since its establishment, with 4 of them being NSFC Young Scientists' Fund, demonstrating that the young scientists nurtured by SKLMP have already been able to compete for research funding at the national level. Since 2012, H2O has received total research funding of RMB¥8 million, confirming the crucial role of H2O in obtaining financial support from the Central Government and the Shenzhen Municipal Government. As a lead institutional member in the establishment of the SMART Consortium, we have been instrumental in drafting the "Shenzhen Marine Industrial Development Plan (2013-2020)" for the Shenzhen Municipal Government, which was announced in December 2013.

As a Partner State Key Laboratory in Hong Kong, SKLMP has an obligation to contribute to the marine environmental research in mainland China, Hong Kong, Macau and Taiwan. Over the past two years, we have taken an active role in visiting local and overseas research institutes for academic exchange. High-level integrated collaborative research has been undertaken with the Woods Hole Oceanographic Institution in the U.S.; the Institut Louis Malardé in French Polynesia; the National Chung Kung University and the National Research Institute of Chinese Medicine, Ministry of Health and Welfare in Taiwan; and Tsinghua University, Nanjing University, Xiamen University in mainland China. SKLMP also organized a series of Xiangjiang Forums to provide a platform for "fostering new ideas and promoting academic integration". The second and third Xiangjiang Forums, entitled "Underwater Observation Technique and Method Symposium" and "Ocean Oasis Brainstorming Symposium", were successfully organized in 2013 to promote in situ, real-time underwater technology. We have also taken the lead in the organization of "The Symposium on the Need for and Development of Marine Science and Technology in Shenzhen" for the Shenzhen Municipal Government. These academic activities demonstrated SKLMP's role as an effective bridge for academic exchange between local and overseas universities, institutes and government authorities.

In addition to focusing on research, SKLMP always remembers its responsibility to serve the community. We continue to promote "The Spin Kid" project which was established in 2012. In view of the strong response to the Spin Kid Project, SKLMP established a new project in 2013, the "Ocean Plus" project. This project aims to educate the general public about the importance of marine ecology and conservation. To date, more than 80 participants have joined "The Spin Kid" and the "Ocean Plus" projects, with 28 and 10 participants who were trained as open water divers and advanced open water divers, respectively. Furthermore, the scheme has produced a pool of scuba divers with a passion for marine conservation, the development of state-of-the-art underwater technology and scuba diving safety. During the course of conducting in situ and real-time monitoring as well as underwater field surveys, we have come to realize the importance of underwater instrumentation, scientific diving and diving safety for marine scientific exploration. As a result, SKLMP, the Shenzhen Municipal Government, the Zhanjiang Diving School of State Sport General Administration and marine-related research institutes in mainland China have co-organized the "Asia-Pacific Underwater Scientific

Technology Workshop" to (1) facilitate development of underwater scientific research, (2) promote professional education in scientific diving, (3) raise public awareness of marine conservation and sustainable use of marine resources, and (4) protect public safety in diving. Additionally, the Asia-Pacific Academy of Underwater Science (APAUS) will be established to consolidate partnership and collaboration among marine environmental scientists and engineers to design, build, and use innovative instruments and systems for underwater monitoring and exploration. The ultimate mission of APAUS is to raise awareness and gain further understanding of the ocean via the development of underwater monitoring instruments, scientific diving and diving safety protocols. "Ocean development" possesses a significant strategic meaning for all maritime countries. The "Twelfth Five-Year Plan" on the marine industry in China has clearly stated the need to optimize resource allocation to technology advancement, to promote innovations in marine science, and to raise the quality of personnel training. SKLMP, as the only State Key Laboratory focusing on marine environmental research in Hong Kong, must take advantage of this unprecedented opportunity to boost our research capacity. SKLMP wishes to be the stage for all SKLMP members to realize their goals and ambitions related to marine exploration, environmental protection, technology development, and community education.

Lastly, I would like to quote a motto from Sun Quan (the Three Kingdoms) as a final remark.

"能用眾力，則無敵於天下矣；能用眾智，則無畏於聖人矣。"

("If we can gather power from the crowd, we can become invincible; to take advantage of the wisdom from the crowd, we must not be afraid of people with high intelligence.")

As the Director of SKLMP, I sincerely hope that all marine-related universities and research institutions can provide mutual support and work in solidarity to guard and protect our blue planet!

The new year has come. I wish you a success in your career and a world of happiness and love as all your dreams come true.

Yours sincerely,

Paul Kwan Sing Lam

Director of the State Key Laboratory in Marine Pollution
31st December 2013

光陰如梭，海洋污染國家重點實驗室（SKLMP）在不知不覺中已走過了五個年頭。2013 年，對 SKLMP 來說是很不平凡的一年，在全體成員的共同努力以及海內外朋友的支持下，我們戰勝了各種困難和挑戰，取得了新的顯著成就，SKLMP 在國內外的競爭力與影響力也逐漸增強。成績來之不易，凝聚了大家的心血和汗水，我在此向大家表示衷心的感謝！我們即將迎來充滿希望的 2014 年，也將是 SKLMP 第一輪評估中最重要的一年。

在 2013 年度裡，實驗室的科研成果水準穩步提升，共爭取經費超過三千四百多萬港幣，新增科研項目 31 項。其中，香港政府資助項目 4 項、教資會資助項目 18 項、內地科研項目 9 項。以 SKLMP 為作者單位之 SCI 論文共 76 篇，論文數目較 2012 年增加了 85%，大多數論文都發表於相關領域的權威學術期刊。而由 2 名或以上 SKLMP 成員合作發表的論文佔了 49%，其中 14%的文章更是由不同成員院校合作發表的，由此表明 SKLMP 在各研究領域逐漸凝聚了一支結構合理、潛心科研、創新能力活躍的優秀人才隊伍。

本年度，香港創新科技署對夥伴國家重點實驗室的資助力度大幅增加，資助金額二百萬港幣提昇至五百萬港幣。為了進一步鼓勵實驗室成員開展創新、前沿的科研工作，SKLMP 把其中 60%的經費投放在科研上，在「SKLMP 種子協作研究基金」（SCRF）、「城大內部博士後基金」（RFP）、「城大內部研究經費」（IRF）的基礎上，再增加了「主題項目」（TBP）資助成員們開展具有申請政府主題研究計劃潛力的先導研究工作，營造了一個寬鬆進取的學術氛圍。

SKLMP 自 2009 年成立以來, 第一屆學術委員會為實驗室的建設及發展制定了策略性計劃，他們的前瞻遠矚為實驗室的成長、發展及定位奠下堅實基礎。在學術委員會的帶領下，實驗室堅持「一國兩制」的方針及走國際化道路, 充分利用香港國際都會城市的優勢, 團結兩岸四地及海外高水準科研團隊，聯合內地兄弟院校，共同推進海洋環境科學前沿研究的發展。今年是第一屆學術委員會服務 SKLMP 的第五個年頭, 我謹代表實驗室全體同仁向他們致以最崇高的敬意及最真摯的謝意。為了更周詳規劃實驗室未來發展方向，SKLMP 確立了包括深圳海洋研究與技術聯盟（SMART）理事長蘇紀蘭院士，以及包括其他六位院士及七位教授在內的第二屆學術委員會委員，並首創引入了由國際知名學者組成的國際顧問委員會(其中不少委員為第一屆學術委員會委員)，旨在汲取國外先進理念及接受國際化考核，進一步增強國際交流與合作，充分匯聚海內外專家的智力資源，為實驗室的定位及發展戰略出謀劃策。

在實驗室的人才隊伍建設方面，實驗室凝聚人才的能力明顯提升。通過重組實驗室成員，我們吸納了 11 名不同領域的科學家加入 SKLMP，他們的加盟為 SKLMP 注入了新鮮血液，也為實驗室的發展增添了新動力。

在實驗室管理方面，我室與夥伴實驗室——廈門大學近海海洋環境科學國家重點實驗室（MEL）共同建立具有國際水準的「海洋與環境大型儀器與技術服務中心」，強化了實驗室的大型儀器管理與共用，有效提高了儀器的使用效率及技術支撐團隊的專業素質，這使 MEL 連續兩年在中國科學技術信息研究所進行的國家重點實驗室科技資源信息開放共享評估中位列第一。MEL 在資源信息開放共享方面的成功模式，也為 SKLMP 樹立了學習的榜樣。

SKLMP 在內地設立的分室——海洋與人類健康研究中心（H2O）於 2013 年 10 月 11 日正式啟用。H2O 今年新增科研項目 8 項，包括 2 項國家自然科學基金項目與 6 項深圳市科技計劃項目，累積

研究項目共 20 項。令人欣慰的是其中獲國家自然科學青年基金項目 4 項, 足以証明由 SKLMP 培養的優秀青年科研人員已開始嶄露頭角。研究中心自 2012 年成立以來，科研經費累計超過八百萬人民幣，顯示了 H2O 在國內逐漸發揮其重要的樞紐作用。作為主要創建院校之 SMART 承接並負責深圳市人民政府《深圳海洋產業發展規劃(2013-2020)》之編寫，該規劃已於 2013 年 12 月正式發佈。

SKLMP 作為境外的國家重點實驗室，推動兩岸四地的海洋環境科學發展有著義不容辭的責任。在過去的一年多時間裡，我室的國內外學術交流與合作活躍。與美國 Woods Hole Oceanographic Institution，法屬波利尼西亞 Institut Louis Malardé，台灣國立成功大學及中國醫藥研究所、清華大學、南京大學、廈門大學等都開展了一系列高水準整合性的合作研究。我們利用 SKLMP 自創的「香江海洋論壇」這個學術交流平臺，承辦了香江海洋論壇第二講——水下在線觀測技術與方法、與第三講——海洋綠舟建設集思會，同時承辦深圳市海洋科技需求與技術發展研討會等會議，加強自主創新與學科的交叉融合，充分展示了 SKLMP 在學術交流方面的橋樑作用。

另外，SKLMP 時刻謹記社會責任及公共教育。海洋研究離不開出海作業、實地及實時觀察，我們在水下工作過程中發現水下科學儀器、科學潛水及潛水安全對海洋科學的探索及發現極為重要。因此，SKLMP 與深圳市政府、國家體育總局湛江潛水運動學校及國內其他多間開展海洋科學研究的科研院所，共同舉辦了亞太水下科學技術研討會，希望能推動水下科學研究工作的發展，推廣及發展專業科學潛水安全教育，加強海洋資源的可持續利用與保育觀念，保障公共安全。同時，SKLMP 持續推廣 2012 年啟動的「哪吒計劃」，並在此基礎上孕育出培養「民間海洋科學家」的「海洋+計劃」，兩個計劃共計成功培養開放水域潛水員 28 名，開放水域進階潛水員 10 名，參與活動人數累積超過 80 人次, 為水下科學研究、技術開發和水下安全服務提供了人才儲備。並倡導成立「亞太水下科學院」, 培育海洋科學家與工程師之間的夥伴關係，結合兩者的力量共同設計、建造、使用創新儀器和系統。最終希望通過開發水下精密儀器及科學安全潛水教育, 用創新途徑探索海洋, 增加人類對海洋的認識。海洋發展對各涉海國家都具有重要的戰略意義，中國海洋事業的十二五規劃中明確提出將優化配置科技資源，切實提高海洋科技創新能力和人才培養力度。SKLMP 作為香港唯一從事海洋環境研究的國家重點實驗室，如能抓住機遇，將有望迎來一個前所未有的實力快速提升階段。SKLMP 願作為一個平臺，在大家的共同努力下，實現大家的海洋夢！

最後容我引用三國孫權的名言:

“能用眾力，則無敵於天下矣；能用眾智，則無畏於聖人矣。”

作為結語，身為海洋人，我真誠希望各涉海高校研究單位在實現各自夢想的過程中，彼此能夠守望相助、同舟共濟、精誠合作, 努力守護這個我們賴以生存的藍色星球，携手共圓中國海洋夢！

新的一年即將到來，辭舊迎新之際，祝您們事業更上一層樓，家庭幸福美滿，萬事順意！

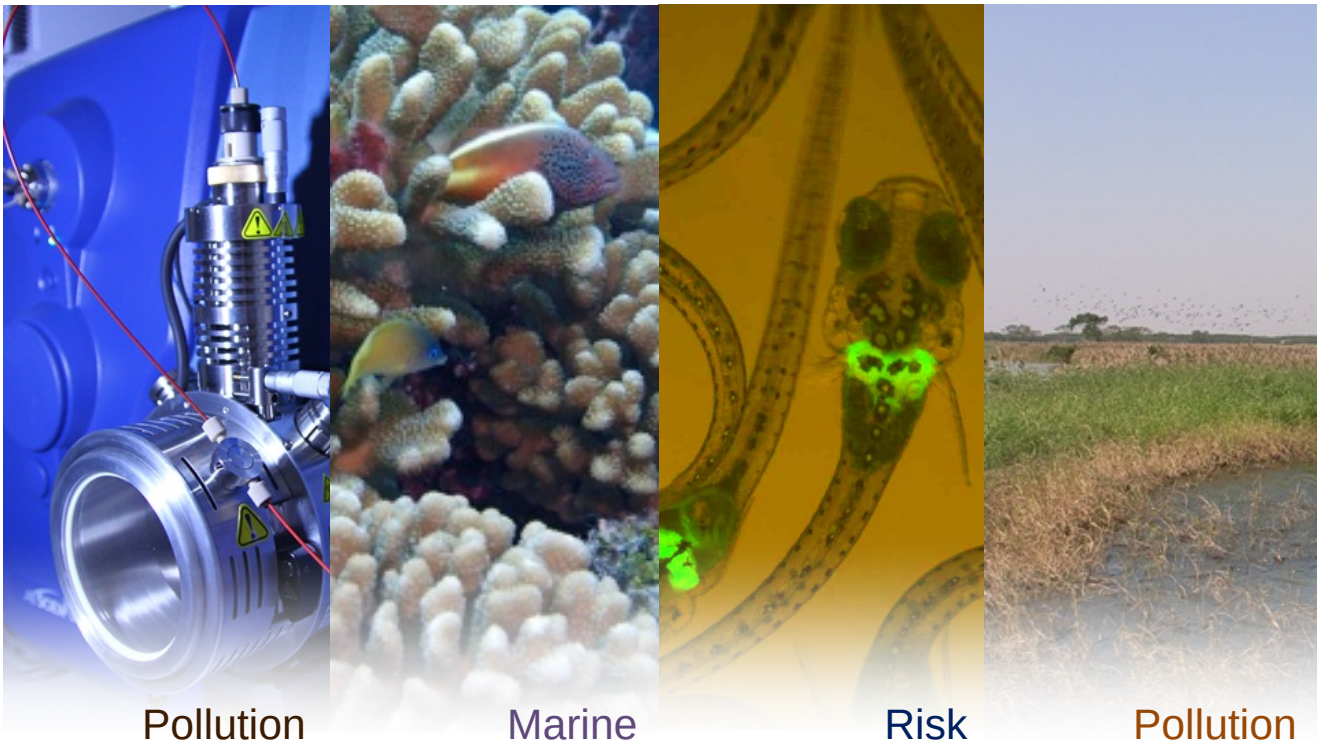
林群聲

海洋污染國家重點實驗室主任

二零一三年十二月三十一日

Research Scopes in SKLMP
實驗室研究範疇

研究範疇 1 Research Scope 1	研究範疇 2 Research Scope 2	研究範疇 3 Research Scope 3	研究範疇 4 Research Scope 4



Pollution Monitoring Technology	Marine Ecosystem	Risk Assessment	Pollution Control and Bioremediation
污染檢測技術	海洋生態系統	風險評估	污染控制與生物修復

The SKLMP Academic Committee Members
學術委員會委員

Chairman 主席*

Dr. Don M. ANDERSON (Invited)
Senior Scientist in the Biology Department of the Woods Hole Oceanographic Institution (WHOI) and Director of the Coastal Ocean Institute, USA.
美國伍茲霍爾海洋研究所生物系高級科學家及濱海海洋研究所主任

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Emeritus Professor and former Dean in the Griffith School of the Environment, Griffith University, Australia.
澳洲格里菲斯大學環境科學學院教授

Prof. Min Han DAI 戴民漢 教授
Cheung Kong Chair Professor and
Director of the State Key Laboratory of Marine Environmental Science, Xiamen University.
近海海洋環境科學國家重點實驗室(廈門大學)主任及講座教授

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Prof. David E. HINTON
The Nicholas Professor of Environmental Quality at Duke University, USA.
美國杜克大學環境與地球科學院教授

Prof. Hua Sheng HONG 洪華生 教授
Chair Professor of Xiamen University and
Vice-President of the Scientific Committee on Ocean Research, the International Council for Science.
廈門大學講座教授及國際海洋研究科學委員會(SCOR)副主席

Prof. Gui Bin JIANG 江桂斌 院士
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* The Chairman, Prof. George K. IWAMA, has stepped down.
Prof. George K. IWAMA 已卸任學術委員會主席

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Professor of the Department of Physics and Materials Science 物理及材料科學系教授

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近海海洋環境科學國家重點實驗室主任及講座教授

Co-opted members from 2013
2013 年增選成員

City University of Hong Kong　香港城市大學

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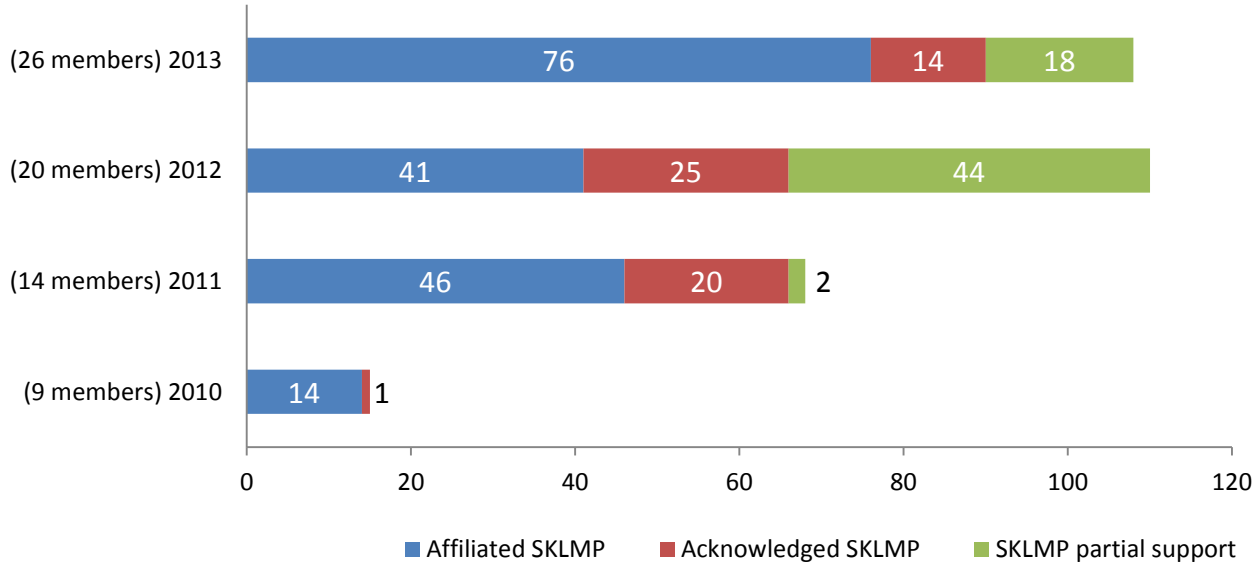
Laboratory research team member 實驗室研究團隊成員

Research Output ^
研究成果

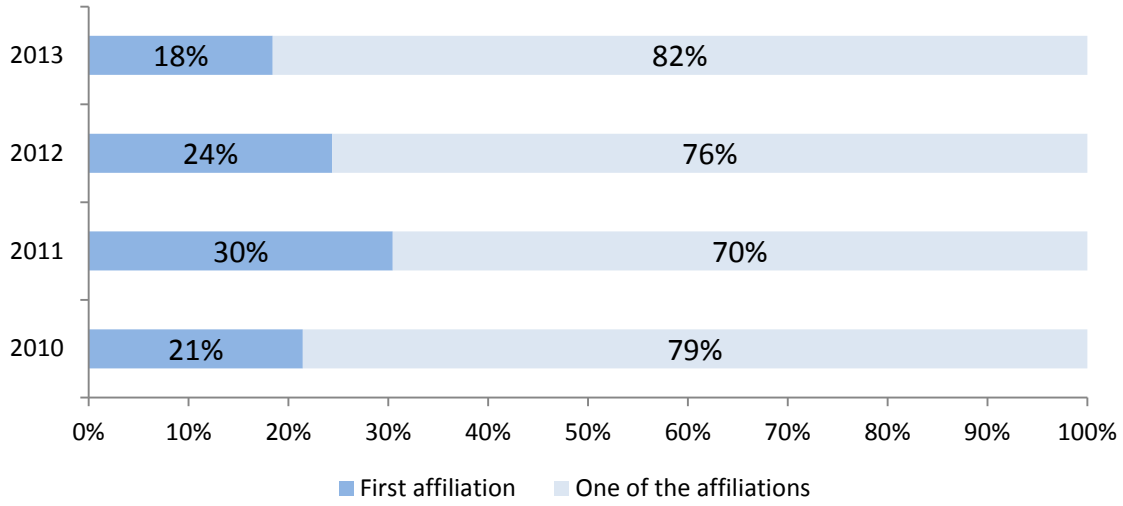
Number of SCI publications of SKLMP (2010-2013)

2010-2013 SKLMP 的 SCI 論文數目



Percentage of SCI publications with SKLMP as first affiliation and one of the affiliations in 2010-2013

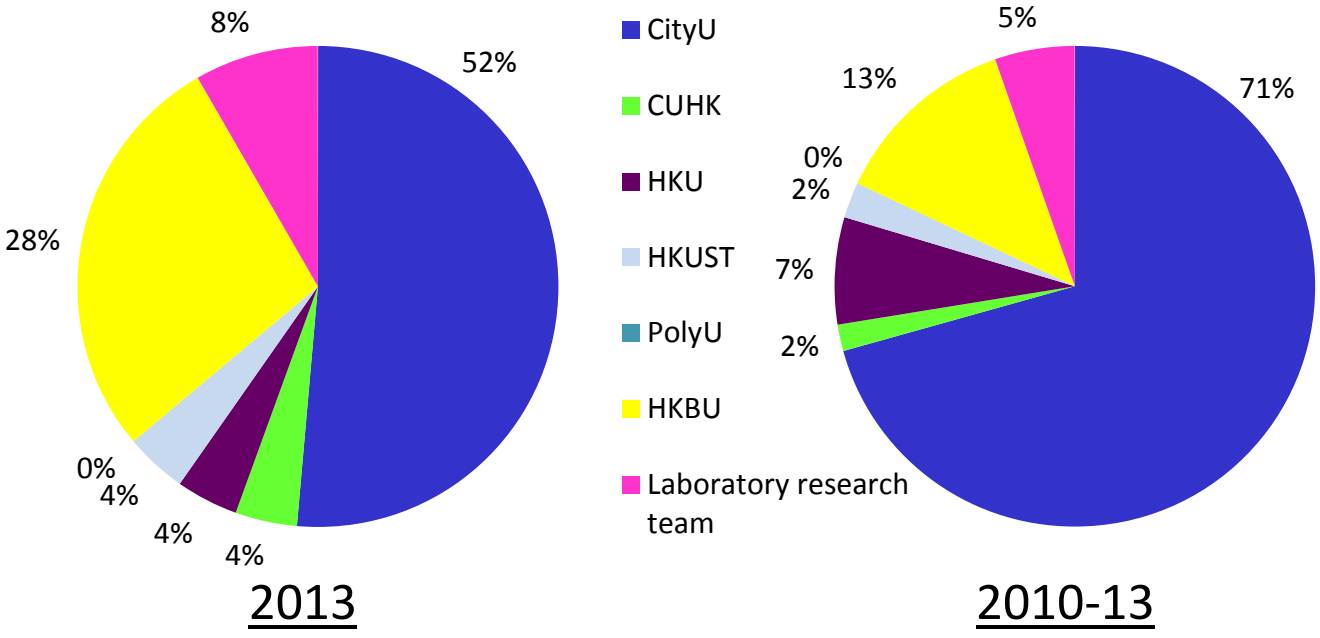
2010-2013 年以 SKLMP 為第一作者單位和其它作者單位的論文百分比



^ Research output contributed by members.
Number of members in 2010-12: CityU (13), CUHK (3), HKU (5), HKUST (6), PolyU (1), HKBU (2), Laboratory research team (1)
Number of members in 2013: CityU (15), CUHK (2), HKU (5), HKUST (5), PolyU (1), HKBU (7), Laboratory research team (3)

Percentage of SCI publications affiliated SKLMP per institution and laboratory research team

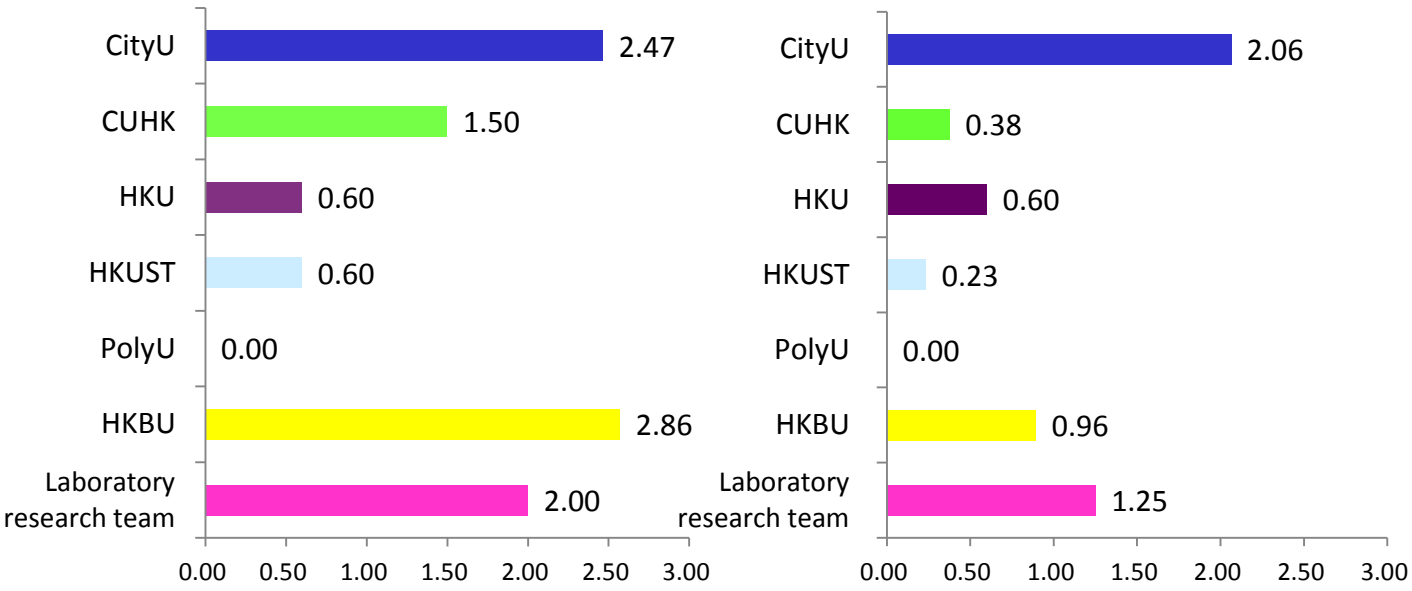
各成員院校及實驗室研究團隊發表 SCI 論文的比例



2013 2010-13

Average active index* of 6 institutions and laboratory research team

成員院校及實驗室研究團隊的活躍指數*



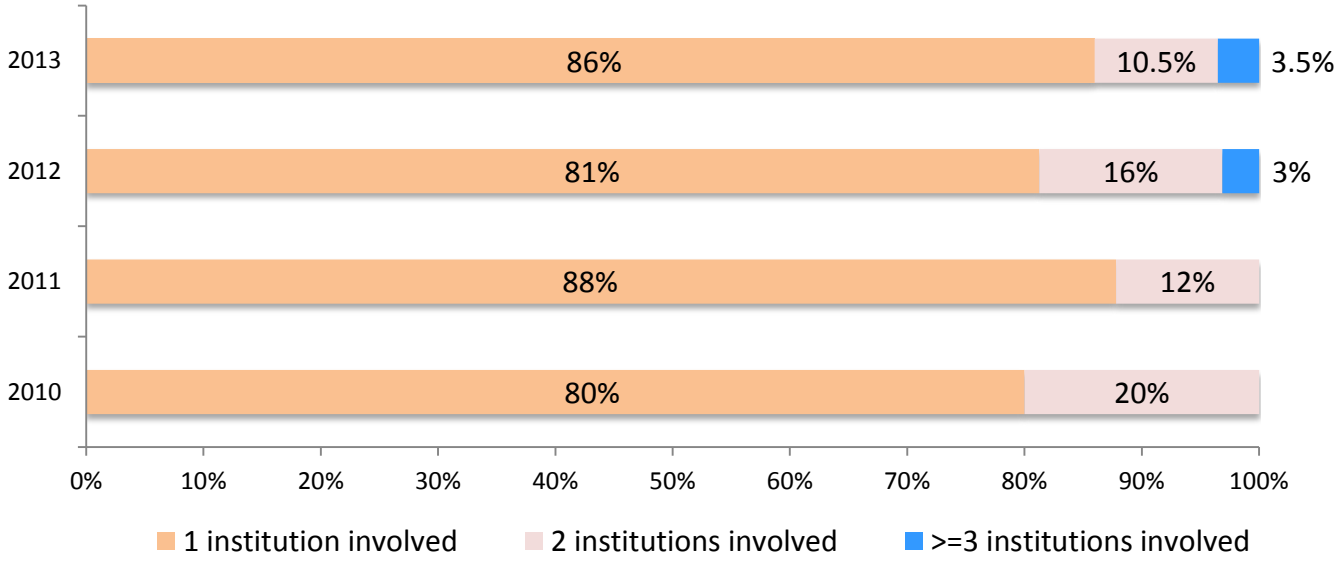
2013 2010-13

*Average active index = SCI publications/members per institution

平均活躍指數 = SCI 文章數目/院校成員人數

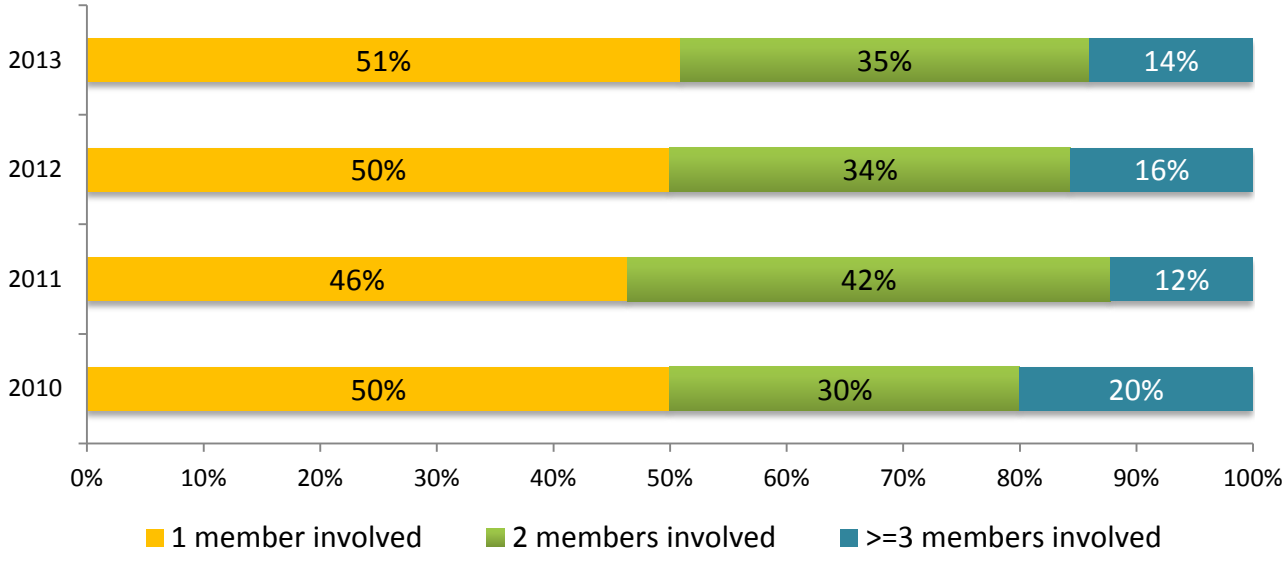
Degree of collaboration among member institutions based on SCI publications in 2010-2013

2010-2013 年成員院校合作發表 SCI 文章的情況



Degree of collaboration among members based on SCI publications in 2010-2013

2010-2013 年成員合作發表 SCI 文章的情況



* All publications affiliated SKLMP

Part 1. Papers with the SKLMP included as the first affiliation

以 SKLMP 為第一單位的期刊論文

1. Yu, W.K., Shi, Y.F., Fong, C.C., Chen, Y., van de Merwe, J.P., Chan, A.K.Y., Wei, F., Bo, J., Ye, R., **Au, D.W.T.**, **Wu, R.S.S.**, **Yang, M.S.** (2013)
Gender-specific Transcriptional Profiling of Marine Medaka (*Oryzias melastigma*) Liver upon BDE-47 Exposure.
Comparative Biochemistry and Physiology Part D: Genomics and Proteomics, 8(3):255-262.

2. Mak, Y.L., Wu, J.J., Chan, W.H., **Murphy, M.B.**, **Lam, J.C.W.**, **Chan, L.L.**, **Lam, P.K.S.** (2013)
Simultaneous Quantification of Pacific Ciguatoxins in Fish Blood Using Liquid Chromatography-tandem Mass Spectrometry.
Analytical and Bioanalytical Chemistry, 405(10):3331-3340.

3. Yeung, L.W.Y., De Silva, A.O., Loi, E.I.H., Marvin, C.H., Taniyasu, S., Yamashita, N., Mabury, S.A., Muir, D.C.G., **Lam, P.K.S.** (2013)
Perfluoroalkyl Substances and Extractable Organic Fluorine in Surface Sediments and Cores from Lake Ontario. *Environment International*, 59:389-397.

4. Zhu, B.Q., **Lam, J.C.W.**, Yang, S.Y., **Lam, P.K.S.** (2013)
Conventional and Emerging Halogenated Flame Retardants (HFRs) in Sediment of Yangtze River Delta (YRD) Region, East China.
Chemosphere, 93(3):555-560.

5. Leung, H.W., Jin, L., Wei, S., Tsui, M.M.P., Zhou, B.S., Jiao, L.P., Cheung, P.C., Chun, Y.K., **Murphy, M.B.**, **Lam, P.K.S.** (2013)
Pharmaceuticals in Tap Water: Human Health Risk Assessment and Proposed Monitoring Framework in China.
Environmental Health Perspectives, 121(7):839-846.

6. Loi, E.I.H., Yeung, L.W.Y., Mabury, S.A., **Lam, P.K.S**. (2013)
Detections of Commercial Fluorosurfactants in Hong Kong Marine Environment and Human Blood: a Pilot Study.
Environmental Science and Technology, 47(9):4677-4685.

7. Kwok, K.Y., Yamazaki, E., Yamashita, N., Taniyasu, S., **Murphy, M.B.**, Horii, Y., Petrick, G., Kallerborn, R., Kannan, K., Murano, K., **Lam, P.K.S.** (2013)
Transport of Perfluoroalkyl Substances (PFAS) from an Arctic Glacier to Downstream Locations: Implications for Sources. *Science of the Total Environment*, 447:46-55.

8. **Wang, W.X.**, Zhang, Q. (2013)
Dioxin and Phthalate Uptake and Assimilation by the Green Mussel *Perna viridis*.
Environmental Pollution, 178:455-462.

9. Liu, F.J., Rainbow, P.S., **Wang, W.X.** (2013)
Inter-site Differences of Zinc Susceptibility of the Oyster *Crassostrea hongkongensis*.
Aquatic Toxicology, 132:26-33.

10. Liu, F.J., **Wang, W.X.** (2013)
Facilitated Bioaccumulation of Cadmium and Copper in the Oyster *Crassostrea hongkongensis* Solely Exposed to Zinc.
Environmental Science and Technology, 47(3):1670-1677.

11. Man, Y.B., Chan, J.K.Y., Wu, S.C., **Wong, C.K.C.**, **Wong, M.H.** (2013)
Dietary Exposure to DDTs in Two Coastal Cities and an Inland City in China.
Science of the Total Environment, 463:264-273.

12. Hu, Z.M., Ma, L., Xie, J.H., Du, H.X., Lam, W.W.Y., **Lau, T.C.** (2013)
Ruthenium-catalyzed Oxidation of Alcohols by Bromate in Water.
New Journal of Chemistry, 37(6):1707-1710.

13. Mak, Y.L., **Wai, T.C.**, **Murphy, M.B.**, Chan, W.H., Wu, J.J., **Lam, J.C.W.**, **Chan, L.L.**, **Lam, P.K.S.** (2013)
Pacific Ciguatoxins (P-CTXs) in Food Web Components of Coral Reef Systems in the Republic of Kiribati.
Environmental Science and Technology, 47:14070-14079.

14. Wang, W., Wu, F.Y., Huang, M.J., Kang, Y., Cheung, K.C., **Wong, M.H.** (2013)
Size Fraction Effect on Phthalate Esters Accumulation, Bioaccessibility and in Vitro Cytotoxicity of Indoor/Outdoor Dust, and Risk Assessment of Human Exposure.
Journal of Hazardous Materials, 261:753-762.

Part 2. Papers with the SKLMP as one of the affiliations

以 SKLMP 為作者單位之一的期刊論文

1. Leung, J.Y.S., **Cheung, S.G.**, **Qiu, J.W.**, **Ang, P.O.**, **Chiu, J.M.Y.**, Thiyagarajan, V., **Shin, P.K.S.** (2013)
Effect of Parental Hypoxic Exposure on Embryonic Development of the Offspring of Two Serpulid Polychaetes: Implication for Transgenerational Epigenetic Effect.
Marine Pollution Bulletin, 74(1):149-155.

2. Cheung, N.K.M., Cheung, A.C.K., Ye, R.R., **Ge, W.**, **Giesy, J.P.**, **Au, D.W.T.** (2013)
Expression Profile of Oestrogen Receptors and Oestrogen-related Receptors is Organ Specific and Sex Dependent: the Japanese Medaka *Oryzias latipes* Model.
Journal of Fish Biology, 83(2):295-310.

3. Tao, Y., Mao, X., Hu, J., Mok, H.O.L., Wang, L., **Au, D.W.T.**, Zhu, J., Zhang, X. (2013)
Mechanisms of Photosynthetic Inactivation on Growth Suppression of *Microcystis aeruginosa* under UV-C Stress.
Chemosphere, 93(4):637-644.

4. Zhang, X., Cao, B., Wang, J., Liu, J., Tung, V.O.V., **Lam, P.K.S.**, **Chan, L.L.**, **Li, Y.** (2013)
Neurotoxicity and Reactive Astrogliosis in the Anterior Cingulate Cortex in Acute Ciguatera Poisoning.
Neuromolecular Medicine, 15(2):310-323.

5. Wu, J.L., Li, J.P., **Chan, R.K.Y.** (2013)
A Light Sheet Based High Throughput 3D-imaging Flow Cytometer for Phytoplankton Analysis.
Optics Express, 21(12):14474-14480.

6. Wu, J.L., **Chan, R.K.Y.** (2013)
A Fast Fluorescence Imaging Flow Cytometer for Phytoplankton Analysis.
Optics Express, 21(20):23921-23926.

7. Cheng, J.P., Gu, Y.J., **Cheng, S.H.**, Wong, W.T. (2013)
Surface Functionalized Gold Nanoparticles for Drug Delivery.
Journal of Biomedical Nanotechnology, 9(8):1362-1369.

8. Choi, V.W.Y., Ng, C.Y.P., Kong, M.K.Y., **Cheng, S.H.**, **Yu, K.N.** (2013)
Adaptive Response to Ionising Radiation Induced by Cadmium in Zebrafish Embryos.
Journal of Radiological Protection, 33(1):101-112.

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The Multiple Stressor Effect in Zebrafish Embryos from Simultaneous Exposure to Ionising Radiation and Cadmium.
Journal of Radiological Protection, 33(1):113-121.

10. Chen, Y., **Cheung, S.G.**, **Shin, P.K.S.** (2013)
A Baseline Study of Benthic Community Associated with Amphioxus Sand in Subtropical Hong Kong.
Marine Pollution Bulletin, 72(1):274-280.

11. Hu, M.H., Wang, Y.J., **Cheung, S.G.**, **Shin, P.K.S.** (2013)
Comparison of Different Frozen Natural Foods on Survival and Growth of Juvenile Chinese Horseshoe Crab *Tachypleus tridentatus* (Leach, 1819): Implications on Laboratory Culture.
Aquaculture Research, 44(4):567-573.

12. Wang, H.S., Xu, W.F., Chen, Z.J., Cheng, Z., Ge, L.C., Man, Y.B., **Giesy, J.P.**, Du, J., **Wong, C.K.C.**, **Wong, M.H.** (2013)
In Vitro Estimation of Exposure of Hong Kong Residents to Mercury and Methylmercury via Consumption of Market Fishes.
Journal of Hazardous Materials, 248:387-393.

13. Du, X.M., Lei, N.Y., Chiu, H.M., Ge, X.W., Zhang, Z.C., **Lam, M.H.W.** (2013)
Non-invasive in Vivo Imaging of the Ionic Regimes along the Gastrointestinal Tract of a Freshwater Vertebrate Model Organism (Japanese Medaka) Using Responsive Photonic Crystal Beads.
Journal of Materials Chemistry B, 1(11):1535-1540.

14. Bao, V.W.W., **Leung, K.M.Y.**, Lui, G.C.S., **Lam, M.H.W.** (2013)
Acute and Chronic Toxicities of Irgarol Alone and in Combination with Copper to the Marine Copepod *Tigriopus japonicas*.
Chemosphere, 90(3):1140-1148.

15. Xia, C.H., Wu, X.G., **Lam, J.C.W.**, Xie, Z.Q., **Lam, P.K.S.** (2013)
Methylmercury and Trace Elements in the Marine Fish from Coasts of East China.
Journal of Environmental Science and Health Part A: Toxic/Hazardous Substance & Environmental Engineering, 48(12):1491-1501.

16. Wang, J.S., Zhang, Y.T., Zhang, F., Yeung, L.W.Y., Taniyasu, S., Yamazaki, E., Wang, R.P., **Lam, P.K.S.**, Yamashita, N., Dai, J.Y. (2013)
Age- and Gender-Related Accumulation of Perfluoroalkyl Substances in Captive Chinese Alligators (*Alligator sinensis*).
Environmental Pollution, 179:61-67.

17. Zhang, W., Zhang, Y.T., Taniyasu, S., Yeung, L.W.Y., **Lam, P.K.S.**, Wang, J.S., Li, X.H., Yamashita, N., Dai, J.Y. (2013)
Distribution and Fate of Perfluoroalkyl Substances in Municipal Wastewater Treatment Plants in Economically Developed Areas of China.
Environmental Pollution, 176:10-17.

18. Chu, F.F., Chu, P.N., Cai, P.J., Li, W.W., **Lam, P.K.S.**, Zeng, R.J. (2013)
Phosphorus Plays an Important Role in Enhancing Biodiesel Productivity of *Chlorella vulgaris* under Nitrogen Deficiency.
Bioresource Technology, 134:341-346.

19. Xia, B., Gao, Q.F., Dong, S.L., **Shin, P.K.S.**, Wang, F. (2013)
Uptake of Farming Wastes by Silver Carp *Hypophthalmichthys molitrix* in Polyculture Ponds of Grass Carp *Ctenopharyngodon idella*: Evidence from C and N Stable Isotopic Analysis.
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20. Sun, Z.L., Gao, Q.F., Dong, S.L., **Shin, P.K.S.**, Wang, F. (2013)
Seasonal Changes in Food Uptake by the Sea Cucumber *Apostichopus japonicus* in a Farm Pond: Evidence from C and N Stable Isotopes.
Journal of Ocean University of China, 12(1):160-168.

21. Jiang, X.T., Peng, X., Deng, G.H., Sheng, H.F., Wang, Y., Zhou, H.W., **Tam, N.F.Y.** (2013)
Illumina Sequencing of 16S rRNA Tag Revealed Spatial Variations of Bacterial Communities in a Mangrove Wetland.
Microbial Ecology, 66(1):96-104.

22. Yan, Z.Z., **Tam, N.F.Y.** (2013)
Effects of Lead Stress on Anti-oxidative Enzymes and Stress-related Hormones in Seedlings of *Excoecaria agallocha Linn.*
Plant and Soil, 367(1-2):327-338.

23. Wang, P., **Wong, M.H.**, **Tam, N.F.Y.** (2013)
Antioxidant Responses of Two Microalgae, *Selenastrum capricornutum* and *Chlorella sp.*, to Estradiol and Ethinylestradiol.
Journal of Applied Phycology, 25(3):891-903.

24. Wang, P., Luo, L.J., Ke, L., Luan, T.G., **Tam, N.F.Y.** (2013)
Combined Toxicity of Polycyclic Aromatic Hydrocarbons and Heavy Metals to Biochemical and Antioxidant Responses of Free and Immobilized *Selenastrum capricornutum*.
Environmental Toxicology and Chemistry, 32(3):673-683.

25. Cheng, Z., Wang, H.S., Du, J., Sthiannopkao, S., Xing, G.H., Kim, K.W., Yasin, M.S.M., Hashim, J.H., Wong, M.H. (2013)
Dietary Exposure and Risk Assessment of Mercury via Total Diet Study in Cambodia.
Chemosphere, 92(1):143-149.

26. Man, Y.B., Chow, K.L., Kang, Y., **Wong, M.H.** (2013)
Mutagenicity and Genotoxicity of Hong Kong Soils Contaminated by Polycyclic Aromatic Hydrocarbons and Dioxins/Furans.
Mutation Research-Genetic Toxicology and Environmental Mutagenesis, 752(1-2):47-56.

27. Cheng, Z., Nie, X.P., Wang, H.S., **Wong, M.H.** (2013)
Risk Assessments of Human Exposure to Bioaccessible Phthalate Esters through Market Fish Consumption.
Environment International, 57-58:75-80.

28. Su, L., Zou, L., Fong, C.C., Wong, W.L., Wei, F., Wong, K.Y., **Wu, R.S.S.**, **Yang, M.S.** (2013)
Detection of Cancer Biomarkers by Piezoelectric Biosensor Using PZT Ceramic Resonator as the Transducer.
Biosensors and Bioelectronics, 46:155-161.

29. Lai, F.Y., Bruno, R., Leung, H.W., Thai, P.K., Ort, C., Carter, S., **Lam, P.K.S.**, Miller, J. (2013)
Estimating Daily and Diurnal Variations of Illicit Drug Use in Hong Kong: a Pilot Study of Using Wastewater Analysis in an Asia.
Forensic Science International, 233:126-132.

30. **Shin, P.K.S.**, Leung, J.Y.S., **Qiu, J.W.**, **Ang, P.O.**, **Chiu, J.M.Y.**, Thiyagarajane, V., **Cheung, S.G.** (2013)
Hypoxia Induces Abnormal Larval Development and Affects Biofilm - Larval Interaction in the Serpulid Polychaete *Hydroides elegans.*
Marine Pollution Bulletin, 76:291-297.

31. Wang, H.S., Jiang, G.M., Chen, Z.J., Du, J., Man, Y.B., **Giesy, J.P.**, **Wong, C.K.C.**, **Wong, M.H.** (2013)
Concentrations and Congener Profiles of Polybrominated Diphenyl Ethers (PBDEs) in Blood Plasma from Hong Kong: Implications for sources and exposure route.
Journal of Hazardous Materials, 261:253-259.

32. Choi, V.W.Y., Ng, C.Y.P., Kobayashi, A., Konishi, T., Suya, N., Ishikawa, T., **Cheng, S.H.**, **Yu, K.N.** (2013)
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Part 3. Papers with the SKLMP grant or support acknowledged

致謝 SKLMP 支持的期刊論文

1. Tompsett, A.R., Wiseman, S., Higley, E., **Giesy, J.P.**, Hecker, M. (2013)
Effects of Exposure to 17 Alpha-ethynylestradiol During Sexual Differentiation on the Transcriptome of the African Clawed Frog (*Xenopus laevis*).
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Part 4. Papers with the SKLMP partial support

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Atmospheric Deposition of Polycyclic Aromatic Hydrocarbons (PAHs) to a Coastal Site of Hong Kong, South China.
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Marine Ecology Progress Series, 477:135-145.

Attendance at international conferences & titles of presentations
出席的國際會議與報告題目

Dr. Au, D.W.T.

Gender-specific Modulation of Immune System Complement Gene Expression in Marine Medaka *Oryzias melastigma* Following Dietary Exposure of BDE-47.
The SETAC-Australasia
1-3 Oct 2013, Melbourne, Australia.

Japanese Medaka: a Non-mammalian Model for Studying Sex-Dependent Telomere Attrition and Longevity in Vertebrate.
The 19th Japanese Medaka and Zebrafish Meeting
20-21 Sep 2013, Sendai, Japan.

1. Gender-Specific Modulation of Innate Immune Complement Gene Expression in Marine Medaka *Oryzias melastigma* Following Dietary Exposure of BDE-47.
2. Effect of 17α-Ethynilestradiol on Bone Metabolism and Estrogen Related Genes of the Japanese Medaka, *Oryzias latipes.*
3. Quantification of Respiratory Burst in Marine Medaka Larvae.
4. Estrogen Dynamics and Telomere Attrition as Biomarker of Aging in Fish.
5. Immuno-modulatory Effect Due to Hypoxia in Marine Medaka, *Oryzias melastigma*.
6. Aquatic Hypoxia Induced a Lifelong Impairment in Survived Medaka Via Epigenetic Changes.
The 7th International Conference on Marine Pollution and Ecotoxicology
17-21 Jun 2013, Hong Kong, China.

Organ-specific and Sex-dependent Expression of Estrogen Receptors and Estrogen-related Receptors in Japanese Medaka *Oryzias latipes*.
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17-21 Jun 2013, Hong Kong, China.

Development of Marine Medaka as a Marine Fish Model for Immunotoxicology Study.
International Symposium on Pollutant Responses in Marine Organisms
5-8 May 2013, Faro, Portugal.

A Novel Ionizable Cationic Lipid Nanoparticle-based Delivery System for Potential RNAi therapy in Age-related Cartilage Degradation.
Annual Meeting of Orthopedics Research Society
7-11 Feb 2012, San Francisco, USA.

Dr. Chan, L.L.

1. Effects of Environmental Factors on Growth and Toxin Production of Ciguatera-causative Agents.
2. Ciguatera Fish Poisoning: Research and Discoveries through Scuba.
First International Workshop of Harmful Algae Blooms and Eutrophication
15-17 Dec 2013, Hangzhou, China.

Application of Scientific Diving in Marine Research.
Shenzhen Marine Technology Requirements and Technology Development Seminar
26 Nov 2013, Shenzhen, China.

Diving for Science and Public Safety. (Invited Lecture)
Peking University
20 Sep 2013, Beijing, China.

Diving for Science and Public Safety. (Invited Lecture)
National Sun Yat-Sen University
5 Sep 2013, Kaohsiung, Taiwan.

Diving for Science and Public Safety.
Ocean Oasis Brainstorming
20 Jul 2013, Shenzhen, China.

Development and Achievement of State Key Laboratory in Marine Pollution (SKLMP). (Invited Lecture)
Sanya Institute of Deep-Sea Science and Engineering, Chinese Academy of Sciences
29 May 2013, Sanya, China.

Dr. Cheung, S.G.

1. Chronic Toxicity of Cadmium and Tributyltin on Embryos and Larvae of Asian Horseshoe Crab *Tachpleus tridentatus*.
2. Effect of Different Natural Diets on Growth and Cellular Health Status of Captive Juvenile *Tachypleus tridentatus* (Leach, 1819).
3. Analysis of Trophic Relationship of Juvenile Asian Horseshoe Crabs on a Nursery Beach in Hong Kong.
The 22nd Biennial Conference of the Coastal and Estuarine Research Federation
3-7 Nov 2013, California, USA.

1. Physiological Responses and Scope for Growth of a Marine Gastropod, *Nassarius conoidalis*, to Combined Effects of Ocean Acidification and Temperature.
2. Influence of Macrobenthos on Meiobenthic Assemblages in Shallow, Subtidal Sediments at Tai Tam Bay, Hong Kong.
The 48th Annual European Marine Biology Symposium
19-23 Aug 2013, Galway, Ireland.

Response of Nematode Community upon Recovery from Sewage Pollution: Biological Traits Analysis.
The 15th International Meiofauna Conference
22-26 Jul 2013, Seoul, Korea.

1. Physiological Energetics of the Chinese Horseshoe Crabs (*Tachypleus tridentatus*) under Hypoxia Stress and Reoxygenation.
2. Combined Effects of Ocean Acidification, Salinity and Temperature on the Physiology and Scope for Growth of a Marine Gastropod, *Nassarius festivus*.
3. Acute Hypoxia Exposure Affects Gamete Quality and Subsequent Fertilization Success and Embryonic Development in a Serpulid Polychaete.
4. Structure and Biological Trait Composition of Macrofauna and Free-living Nematode Assemblages in a Subtropical Harbour, Hong Kong.
5. Effects of Salinity on the Anatomy and Physiology of Semi-mangrove *Myoporum bontoides*.
6. Structure and Taxonomic Composition of Macrofauna and Free-living Nematode Assemblages in a Subtropical Harbour, Hong Kong.
7. The Larvae of Congeneric Gastropods Showed Differential Responses to the Combined Effects of Ocean Acidification, Temperature and Salinity.
8. Effect of Parental Hypoxia Exposure on the Gamete Quality and Fertilization Success of Two Serpulid Polychaetes *Hydroides elegans* and *Hydroides diramphus*.
9. Soil Microbial Community Structure and Function in Artificially Planted *Sonnertia apetala*, and *S. caseolaris* Forests of Different Stand Ages in Shenzhen Bay, China.
The 7th International Conference on Marine Pollution and Ecotoxicology
17-21 June 2013, Hong Kong, China.

Distribution and Abundance of Juvenile Horseshoe Crabs Along Deep Bay Shores.
Symposium on Deep Bay Wetland Conservation
20-21 Apr 2013, Hong Kong, China.

Dr. Kong, R.Y.C.

Hypoxia-induced Endocrine Disruption and Impairment of Reproductive Functions: in Vivo and in Vitro Studies. (Invited Keynote Lecture)
The 3rd Thai National Symposium on Animal Care and Use for Scientific Purposes
29-31 Jul 2013, Bangkok, Thailand.

1. Role of Hypoxia-inducible Microrna Mir-10b in Regulation of CYP11B1 and CYP11B2 Steroidogenic Enzymes Genes in H295R Cells.
2. Transgenerational Effects of Hypoxia on Reproductive Function in Marine Medaka: An Epigenetic Approach.
3. The Role of Leptin in Hypoxia-induced Endocrine Disruption in Fish.
The 7th International Conference on Marine Pollution and Ecotoxicology
17-21 Jun 2013, Hong Kong, China.

Prof. Lam, P.K.S.

Chemicals of Emerging Concern in China. (Invited Lecture)
The 10th International Symposium on Persistent Toxic Substances
13-17 Aug 2013, Edmonton, Canada.

Prof. Lau, T.C.

Catalytic Oxidation of Organic Substrates by Metal Nitrido Complexes.
The 4th Asian Conference on Coordination Chemistry
4-7 Nov, 2013, Jeju, Korea.

C-H Bond Activation of Alkanes and C-N Bond Cleavage of Anilines by a Ruthenium(VI) Nitrido Complex.
The 16th International Conference on Bioinorganic Chemistry
22-26 Jul 2013, Grenoble, France.

Reactivity of Ruthenium (VI) Nitrido Complexes.
The 3rd Hong Kong-Shanghai-Münster Joint Trilateral Symposium on Organometallic Chemistry
1-2 May 2013, Munster, Germany.

Dr. Shin, P.K.S.

1. Effect of Different Natural Diets on Growth and Cellular Health Status of Captive Juvenile *Tachypleus tridentatus* (Leach, 1819). (Oral Presentation)
2. Chronic Toxicity of Cadmium and Tributylin on Embros and Larvae of Asian Horseshoe Crab *Tachypleus tridentatus*. (Oral Presentation)
3. Analysis of Trophic Relationship of Juvenile Horseshoe Crabs on a Nursery Beach in Hong Kong. (Poster Presentation)
The 22nd Biennial Conference of the Coastal and Estuarine Research Federation
3-7 Nov 2013, San Diego, USA.

1. Hypoxia and Endocrine Disrupting Chemicals: a Case for MERIT (Marine Environmental Research and Innovative Technology). (Keynote Presentation)
2. Physiological Responses and Scope for Growth of a Marine Gastropod, *Nassarius conoidalis*, to Combined Effects of Ocean Acidification and Temperature. (Oral Presentation)
3. Influence of Macrobenthos on Meiobenthic Assemblages in Shallow, Subtidal Sediments at Tai Tam Bay, Hong Kong. (Poster Presentation)
The 48th Annual European Marine Biology Symposium
19-23 Aug 2013, Galway, Ireland.

1. Acute Hypoxia Exposure Affects Gamete Quality and Subsequent Fertilization Success and Embryonic Development in a Serpulid Polychaete. (Oral Presentation)
2. Combined Effects of Ocean Acidification, Salinity and Temperature on the Physiology and Scope for Growth of a Marine Gastropod, *Nassarius festivus*. (Oral Presentation)
3. Structure and Biological Trait Composition of Macrofauna and Free-living Nematode Assemblages in a Subtropical Harbor, Hong Kong. (Oral Presentation)
4. Interactive Effects of Hypoxia and Polybrominated Diphenyl Ethers (PBDEs) on Microbial Community Assembly in Surface Marine Sediments. (Oral Presentation)
5. Soil Microbial Community Structure and Function in Artificially Planted *Sonneratia apetala* and *S. caseolaris* Forests of Different Stand Ages in Shenzhen Bay, China. (Oral Presentation)
6. Physiological Energetics of Juvenile Chinese Horseshoe Crabs (*Tachypleus tridentatus*) under Hypoxic Stress and Reoxygenation. (Poster Presentation)
7. The Larvae of Congeneric Gastropods Showed Differential Responses to the Combined Effects of Ocean Acidification, Temperature and Salinity. (Poster Presentation)
8. Effects of BDE 47 on Colonization of Macrobenthic Fauna under Field Deployment. (Poster Presentation)
9. Effects of Parental Hypoxic Exposure on the Gamete Quality and Fertilization Success of Two Serpulid Polychaetes *Hydroides elegans* and *Hydroides diramphus*. (Poster Presentation)
10. Structure and Taxonomic Composition of Macrofauna and Free-living Nematode Assemblages in a Subtropical Harbour, Hong Kong. (Poster Presentation)
11. Effects of Salinity on the Anatomy and Physiology of Semi-mangrove *Myoporum bontioides*. (Poster Presentation)
12. Designing Molecular Tools for the Analysis of Heavy Metal Tolerance in Lancelets. (Poster Presentation)
The 7th International Conference on Marine Pollution and Ecotoxicology
17-21 Jun 2013, Hong Kong, China.

1. Heavy Metals in Shrimp and Fish of Gei Wais. (Oral Presentation)
2. Distribution and Abundance of Juvenile Horseshoe Crabs along Deep Bay Shores. (Poster Presentation)
Symposium on Deep Bay Wetland Conservation
20-21 Apr 2013, Hong Kong, China.

1. Effects of Acute and Parental Hypoxia Exposure on the Gamete Quality of Two Serpulid Polychaetes, *Hydroides elegans* and *Hydroides driamphus*.
2. Early Life Stages of Barnacles under Hypoxia and Low pH Conditions.
3. Interaction of Decreased pH and Hypoxia Alters Biochemical Composition of Oyster Larvae at the Time of Settlement: New Insights from GC-MS Analysis.
4. Individual and Combined Effects of Hypoxia and PBDE on Larval Settlement of a Marine Polychaete.
5. Effects of BDE 47 on Colonization of Macrobenthic Fauna under Field Deployment.
The 8th Annual Symposium of the Centre for Marine Environmental Research and Innovative Technology
10-11 Jan 2013, Hong Kong, China.

Prof. Tam, N.F.Y.

Mangrove Wetlands: Contamination, Tolerance and Bioremediation Potential.
Keynote Speech at the 7th HT + China and US Eco Partnership Symposium on Wetland Research
11-12 Nov 2013, Hong Kong, China.

Removal, Biosorption and Biodegradation of Wastewater-Borne Toxic Chemicals by Microalgae.
Keynote Speech at the 1st International Conference on Beneficial Uses of Algal Biomass (ICBUAB 2013)
5-8 Nov 2013, Hong Kong, China.

1. Effects of a Congener of Polybrominated Diphenyl Ethers (BDE-47) on the Growth of Two Mangrove Plant Species, Their Uptake, Translocation and Biotransformation.
2. Isolation of Microalgae Tolerant to Polybrominated Diphenyl Ethers (PBDEs) from Wastewater Treatment Plants and Their Removal Ability.
The 13th International Conference on Environmental Science and Technology
5-7 Sep 2013, Athens, Greece.
1. Effects of a Congener of Polybrominated Diphenyl Ethers (BDE-47) on GSH-ascorbate Cycle Related Antioxidants in

the Seedlings of *Kandelia obovata* under Hydroponic Culture. (Oral Presentation)
2. Seasonal Variations of Polybrominated Diphenyl Ethers in Wastewater Treatment Plants in Hong Kong. (Oral Presentation)
3. Repeated Exposure of *Selenastrum capricornutum* to Wastewater Contaminated with Estradiol and Ethinylestradiol: Growth and Removal. (Oral Presentation)
4. Photo-bio-transformation of High Molecular Weight Polycyclic Aromatic Hydrocarbons in Live and Dead *Selenastrum capricornutum* under Gold and White Light. (Oral Presentation)
5. Soil Microbial Community Structure and Function in Artificially Planted *Sonneratia apetala* and *S. caseolaris* Forests of Different Stand Ages in Shenzhen Bay, China. (Oral Presentation)
6. Dynamics of Heavy Metals During Development and Decomposition of Leaves of *Kandelia obovata* and *Avicennia marina* in a Subtropical Mangrove Swamp in China. (Oral Presentation)
7. Differences in Annual Litter Production between Alien and Native Mangrove Species (*Sonneratia apetala* Vs *Kandelia obovata*) in Futian National Nature Reserve, Shenzhen, China. (Poster Presentation)
8. Effects of Salinity on the Anatomy and Physiology of Semi-mangrove *Myoporum bontioides*. (Poster Presentation)
9. Antioxidant Responses of Two Mangrove Plant Species *Kandelia obovata* and *Avicennia marina* to a Congener of Polybrominated Diphenyl Ethers (BDE-47). (Poster Presentation)
10. Establishment and Changes of Biofilms on Mangrove Sediments Contaminated with Phenolic Endocrine-disruptors. (Poster Presentation)
11. Removal Processes of Selected Phenolic Endocrine Disrupting Chemicals in Simulated Estuary Water-sediment Column: the Role of Organic Matter. (Poster Presentation)
12. Seasonal Changes of Nutrient Levels and Nutrient Resorption in *Avicennia marina* Leaves in Yingluo Bay, China. (Poster Presentation)
The 7th International Conference on Marine Pollution and Ecotoxicology
17-21 Jun 2013, Hong Kong, China.

Polybrominated Diphenyl Ethers in Wastewater Treatment Plants and Their Removal.
The 8th Annual International Symposium on Environment
13-16 May 2013, Athens, Greece.

Dr. Qiu, J.W.

Biological Control of Golden Apple Snail by Black Carp in a Freshwater Wetland. (Oral Presentation by Student Kelvin Ip)
The 18th International Conference on Aquatic Invasive Species
21-25 Aug 2013, Ontario, Canada.

1. The Proteomics Responses of Apple Snails to Heat Stress. (Poster Presentation)
2. The Transcriptome-aided Proteomic Analysis of Growth Anomalies in the Brain Corals *Platygyra carnosus.* (Poster Presentation)
Marine Molecular Ecology, Gordon Research Conference
11-16 Aug 2013, Hong Kong, China.

1. Polychaete Taxonomy, One on a New Species of *Chaetopterus* from Hong Kong. (Poster Presentation)
2. The Discovery of the Full Mitochondrial Genome of *Capitella capitata.* (Poster Presentation)
The 11th International Polychaete Conference
6-9 Aug 2013, Sydney, Australia.

香港珊瑚的生物侵蝕與保護
第二屆海南綠色發展論壇，海口東海岸國家綠色發展示範區發展戰略研討
8-9 Jan 2013, Haikou, Hainan.

Prof. Wong, M.H.

Human Exposure to Particle Bound Pops via Air Particulate and Dust in Guangzhou & Hong Kong.
International Conference on Atmospheric Science and Air Pollution Control, the 7th Fine and Ultrafine Particles Workshop
9-11 Oct 2013, Ningbo, China.

Environmental and Health Impacts of Uncontrolled Recycling and Disposal of Electronic Waste – Call for International Collaboration.
Cleanup 13 Conference (5th International Contaminated Site Remediation Conference)
15-18 Sep 2013, Melbourne, Australia.

Dr. Gan, J.P.

Coupled Physical-biogeochemical Modeling: Scientifically-based Numerical Simulation in China Seas.
CAS-TWAS-WMO Forum, the International Workshop on Operational Oceanography for Developing Countries
9-12 Sep 2013, Beijing, China.

Transport and Exchange Dynamics in China Seas: Modeling Study.
The 10th Asia Oceania Geosciences Society Annual Meeting
24-28 Jun 2013, Brisbane, Australia.

Cross-isobath Geostrophic Transport in the Shelf Sea.
The 5th International Workshop on Modeling the Ocean
17-20 Jun 2013, Bergen, Norway.

Investigation of Multi-scale Biophysical Dynamics by a Coupled Physics-biogeochemistry Modeling System in the China Seas.
The 17th Pacific-Asian Marginal Seas Meeting
23-25 Apr 2013, Hangzhou, China.

Coupled Physics-biogeochemistry in China Seas: Modeling Study.
The 5th OFES International Workshop
24-25 Jan 2013, Okinawa, Japan.

A Numerical Study of Coupled Estuary-Shelf Circulation around the Pearl River Estuary During Summer: Responses to Variable Winds, Tides and River Discharge.
The 8th Annual Symposium of the Centre for Marine Environmental Research and Innovative Technology
10-11 Jan 2013, Hong Kong, China.

Dr. Lau, S.C.K.

Lysogeny Mediates the Survival of *E. coli* in Marine Sediment.
The 12th Symposium on Bacterial Genetics and Ecology
9-13 Jun 2013, Ljubljana, Slovenia.

Change in Population Structure of *E. coli* During a Habitat Transition from Animal Host to Marine Sediment.
American Society for Microbiology General Meeting
18-21 May 2013, Denver, USA.

Physical and Microbial Characterization of Aerobic Microgranules Nitrifying SUPR Effluent.
Water Research Conference
20-23 Jan 2013, Singapore.

Monitoring the Microbiological Quality of Water Resources: Present Status and Future Challenges.
Association of Pacific Rim Universities Fellows Program
28 May-1 Jun 2012, Singapore.

Prof. Leung, K.M.Y.

1. Developing a Platform of Environmental Omics for the Green Lipped Mussel *Perna viridis.*
2. Mechanistic Study on the Organotin-mediated Imposex in the Intertidal Whelk Thais Clavigera Using RNA-Sequencing Analysis.
The 7th International Conference on Marine Pollution and Ecotoxicology
17-21 Jun 2013, Hong Kong, China.

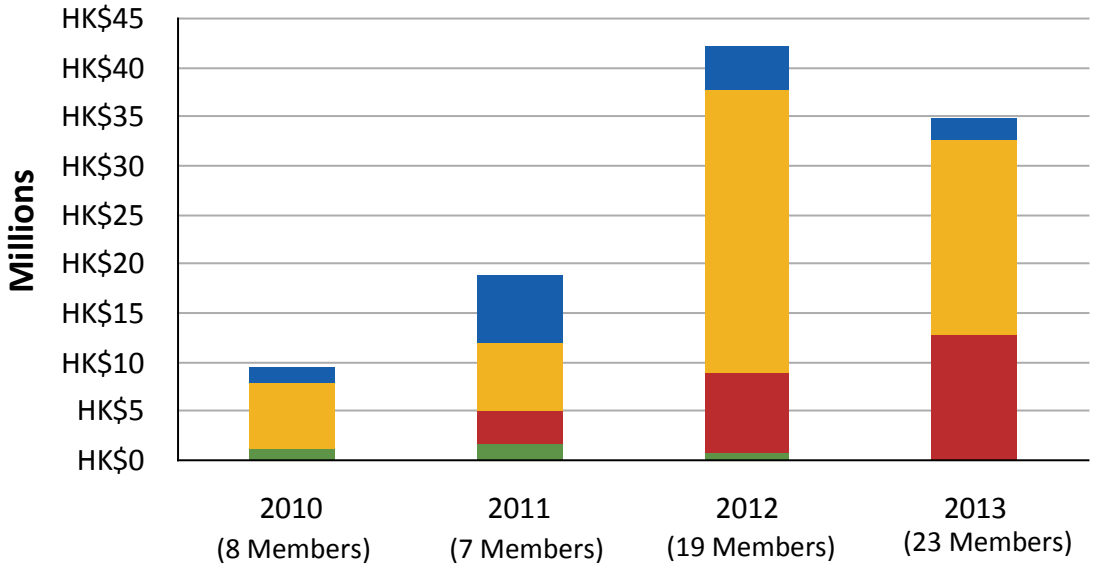
Isoform-specific Responses of Metallothioneins in the Marine Pollution Biomonitor Green-Lipped Mussel, *Perna viridis*, Towards Different Stress Stimulations.
Society of Environmental Toxicology and Chemistry Asia Pacific 2012 Annual Meeting
24-27 Sep 2012, Kumamoto, Japan.

Dr. Liu, H.B.

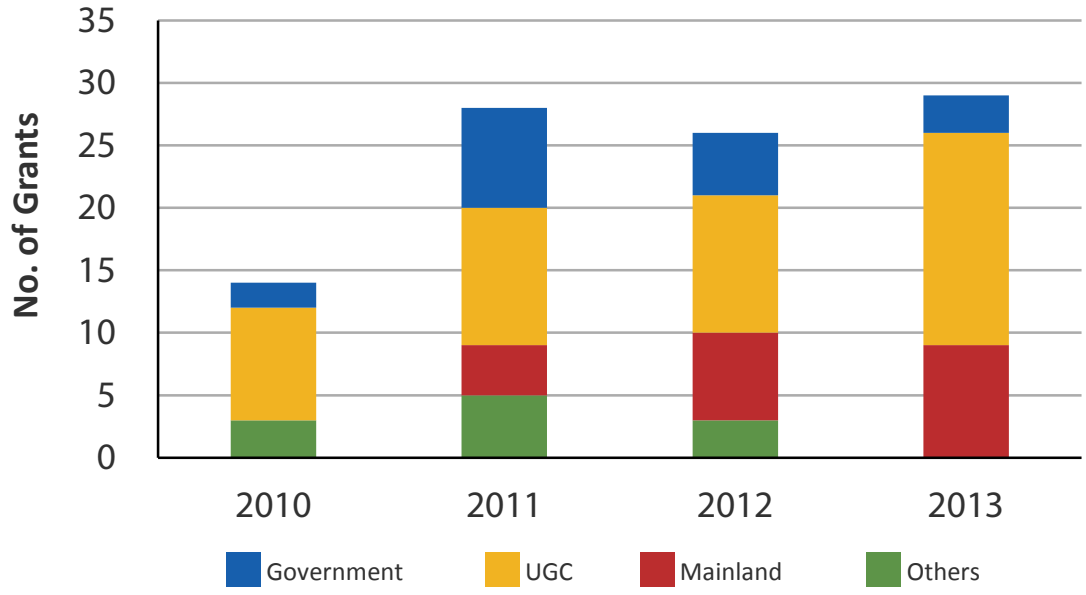
Effect of Diatom Silica Content on Copepod Grazing, Growth and Reproduction.
Association for the Sciences of Limnology and Oceanography 2013 Aquatic Science Meeting
17-22 Feb 2013, New Orleans, USA.

Research Grants 研究資助^

Amount of Competitive External Research Grants (2010-2013)*
2010-2013 外部的研究資助總額*



Number of Competitive External Research Grants (2010-2013)
2010-2013 外部的研究資助項目統計



^ Research output contributed by members.
Number of members in 2010-12: CityU (13), CUHK (3), HKU (5), HKUST (6), PolyU (1), HKBU (2), Laboratory research team (1)
Number of members in 2013: CityU (15), CUHK (2), HKU (5), HKUST (5), PolyU (1), HKBU (7), Laboratory research team (3)

*RMB¥1=HKD$1.26 (2013)

Grants from Hong Kong 香港科研資助

Government 政府部門

	Project Title *	Grant Type	Investigator(s)	Amount (HK$)
	2013			
1	Molecular Mechanism of Ciguatera Fish Poisoning Associated Neurological Effects and Identification of Potential Treatment 魚中毒雪卡毒素後相關神經學效應的分子機理以及潛在治療方法的探究	Health and Medical Research Fund (HMRF) 醫療衞生研究基金	PI: Ma, E.C.H. Co-I: Chan, L.L.	979,400
2	Development of Osmium-based Compounds as Anti-cancer Drugs (2013-2015) 開發含鋨配合物的抗癌藥物	Innovation and Technology Fund 創新及科技基金	PI: Lau, T.C. Co-I: Lam, M.H.W	971,000
3	Contract No. HHZMB 2/2012 (EP) Fish Resources Study for the Proposed Marine Park in the Brother Islands – Additional Ichthyoplankton Survey 大小磨刀島嶼（規劃中的）海岸公園的魚類資源研究－魚類浮游生物調查	Highways Department 路政署	PI: Lam, P.K.S. Co-I: Wai, T.C.	238,000
4	Provision of Services to Study the Aquatic Ecosystem and Water Quality Management of Deep Bay 后海灣水生生態和水品質管制研究	Environmental Protection Department 環境保護署	PI: Lam, P.K.S. Co-I: Chan, L.L Co-I: Wai, T.C. Co-I: Lam, J.C.W.	648,440
	Subtotal			2,836,840
	2012			
5	Survey of Juvenile Fish Resources at the Three Marine Parks at Northeast Hong Kong 香港東北地區三個海岸公園的幼魚資源調查	Agriculture Fisheries and Conservation Department 漁農自然護理署	PI: Leung, K.M.Y. Co-I: Leung, P.T.Y. Co-I: Yau, C. Co-I: Lai, V.C.S.	798,000
6	Dosing of Ferric Iron for the Control of Odour Problems in Typhoon Shelters 三價鐵離子用於解決颱風避難所的空氣臭味問題的研究	Environment and Conservation Fund 環境及自然保育基金	PI: Li, X.Y.	1,058,500
7	Field Sampling, Species Identification and Data Analysis of Benthic Infaunal Communities of Hong Kong Marine Waters 香港水域底棲水生動物群落的採樣、種類鑒定和數據分析	Environmental Protection Department 環境保護署	PI: Qiu, J.W. Co-I: Leung, K.M.Y. Co-I: Li, X.Z.	800,000
8	Analysis of the Relationship between Marine Water Quality Parameters and Climatic and Other Environmental Factors 海洋水質參數與氣候及其他環境因子的關係研究	Environmental Protection Department 環境保護署	PI: Li, W.K. Co-I: Leung, K.M.Y	515,000

* 項目名稱以英文譯本為準

Government 政府部門

	Project Title *	Grant Type	Investigator(s)	Amount (HK$)
9	Fish Resources Study for the Proposed Marin Park in the Brothers Islands 大小磨刀島嶼（規劃中的）海岸公園的魚類資源研究	Highways Department 路政署	PI: Lam, P.K.S. Co-I: Wai, T.C.	1,180,000
10	Application of Cold Plasma Techniques for Disinfection of Bacteria of Air Ventilation Systems in Hospitals and Healthcare Facilities 冷等離子體技術在醫院及其他醫療保健場所通風系統殺菌中的應用	Research Fund for the Control of Infectious Diseases 控制傳染病研究基金	Co-I: Kong, R.Y.C.	1,000,000
11	Erosion and Growth of Massive Corals in Hong Kong 香港大型珊瑚的侵蝕與生長	Environment and Conservation Fund 環境及自然保育基金	PI: Qiu, J.W.	981,000
	Subtotal			6,332,500
	2011			
12	Effect of Vaccine Combined with Traditional Chinese Medicine on Prevention of Disease in Grey Mullet 結合傳統中藥的疫苗對鯔魚疾病防治的研究	Agriculture Fisheries and Conservation Department 漁農自然護理署	PI: Wong, M.H.	410,000
13	Provision of Services for the Technical Review and Statistical Analysis of the Datasets of Waterbird Monitoring Programme for the Deep Bay Area and Baseline Ecological Monitoring Programme for the Mai Po Inner Deep Bay Ramsar Site 后海灣水鳥監控程序數據集和米埔內后海灣拉姆薩爾國際重要濕地生態基線監控程序數據集的技術評審和統計分析服務供給	Agriculture Fisheries and Conservation Department 漁農自然護理署	PI: Lam, P.K.S.	793,500
14	Removal Efficiencies of Toxic Chemicals in Sewage Treatment Works in Hong Kong 香港污水處理廠有毒化學物質的清除效率研究	Drainage Services Department 渠務署	PI: Wong, M.H.	900,000
15	Integrated Fish Pond Farming Using Food Processing Waste: for Quality Fish Production and Habitat Conservation 利用食品加工廢棄物用於池塘漁業養殖：用於高質量魚產品的養殖以及生境保護	Environment and Conservation Fund 環境及自然保育基金	PI: Wong, M.H.	1,900,000
16	International Conference on Deriving Environmental Quality Standards for the Protection of Aquatic Ecosystems (EQSPAE-2011) 水生生態保護的環境品質標準國際會議	Environment and Conservation Fund 環境及自然保育基金	PI: Leung, K.M.Y.	495,800

Government 政府部門

	Project Title *	Grant Type	Investigator(s)	Amount (HK$)
17	A Review of Marine Biodiversity and Ecological Surveys in Hong Kong 香港海洋生物多樣性和生態調查	Environment and Conservation Fund 環境及自然保育基金	PI: Williams, G.A. Co-I: Leung, K.M.Y.	456,380
18	Review and Development of Marine Water Quality Objectives-feasibility Study 海水水質目標的回顧與發展 - 可行性分析	Environmental Protection Department 環境保護署	Co-I: Kong, R.Y.C.	860,000
19	High Efficiency-multifunction-green-vertical Municipal Wastewater Treatment System: Development and Demonstration 高效多功能綠色直立城市廢水處理系統的發展與示範	Innovation and Technology Fund 創新及科技基金	PI: Tam, N.F.Y.	1,080,000
	Subtotal			6,895,680
	2010			
20	Qualification of Antibiotic Residues and Microbial Antibiotic-resistant Genes in Fish Ponds and Marine Culture Zones of Hong Kong 抗生素殘留以及香港魚塘和海洋養殖區微生物抗生素耐藥基因的定量分析	Environment and Conservation Fund 環境及自然保育基金	Co-I: Leung, K.M.Y.	499,880
21	Development of Highly Efficient Semiconductor Nanoparticles as Photocatalysts for the Degradation of Organic Pollutants in Water under Visible Light 可作光催化劑對水中有機污染物進行可見光降解的高效半導體納米粒子的開發	Innovation and Technology Fund 創新及科技基金	PI: Lau, T.C.	998,430
	Subtotal			1,498,310

University Grants Committee 大學教育資助委員會

	Project Title	Grant Type	Investigator(s)	Amount (HK$)
	2013			
1	Estrogenic Chemicals Impair Immune Function and Reproduction in Fish: Unraveling Gender Specific Effects and Underlying Mechanisms 外源性雌激素對魚類免疫以及生殖系統的影響：揭示其機理以及性別特異性反應	General Research Fund 優配研究金	PI: Au, D.W.T.	779,429

University Grants Committee 大學教育資助委員會

	Project Title	Grant Type	Investigator(s)	Amount (HK$)
2	Uncovering the Cellular and Molecular Mechanisms of Delayed Heat Regeneration in the Zebrafish Mutant Breakdance 揭開在斑馬魚突變體霹靂舞的延遲心臟再生的細胞和分子機制	General Research Fund 優配研究金	PI: Cheng, S.H.	779,429
3	Trophic and Growth Analysis of Marine Subtidal Gastropod 不同亞熱帶環境下海洋潮下帶腹足類群落營養及生長分析	General Research Fund 優配研究金	Co-I: Cheung, S.G.	850,444
4	Response of Air-sea CO_2 Fluxes in the Northern South China Sea to Carbon Export Associated with the Pearl River Plume 中國南海北部海氣二氧化碳通量對與珠江羽流相關碳輸出的響應	Research Grants Council 研究資助局	PI: Gan, J.P.	1,125,000
5	Phylogenetic Diversity and Contribution of Anaerobic Ammonium Oxidation (Anammox) Bacteria to Nitrogen Removal in Mangrove Wetland Ecosystem 紅樹林濕地生態系統中厭氧氨氧化細菌的系統發育多樣性和豐度	General Research Fund 優配研究金	PI: Gu, J.D.	656,521
6	Personal Genomics and the Lay Construction of Scientific Knowledge in Online Forums 個人基因與網上討論區上外行建構的科學知識	General Research Fund 優配研究金	Co-I: Kong, R.Y.C.	483,855
7	Evaluation of Glucuronide and Sulfate Metabolic Conjugates of Bisphenol-A (BPA) and Tetrabromobisphenol-A (TBBPA) in Municipal Wastewaters as Population Exposure Markers for the Endocrine Disrupting Chemicals 以葡糖苷酸和雙酚-A 與四溴雙酚-A 的硫酸代謝配合物作為城市污水中內分泌干擾物人群暴露標記的評價	General Research Fund 優配研究金	PI: Lam, M.H.W.	559,800
8	Population Trends, Food Sources, Habitat Use, and Race Element Exposure of Marine Mammals in Pearl River Delta: Using Teeth as Biological Time Capsules for Tracing Environmental Changes (2014-2016) 珠江三角洲海洋哺乳動物種群趨勢、食物源、棲息地利用與微量元素暴露量：利用牙齒作為生物時間囊以追蹤與檢測環境變化	General Research Fund 優配研究金	PI: Lam P.K.S. Co-I: Lam, J.C.W. Co-I: Wai, T.C. Co-I: Chang, C.W. Co-I: Huang, S.L. Co-I: Wang, C.H. Co-I: Yao, C.J.	435,614
9	Pharmaceuticals in Municipal Sewage Treatment Works of China: Behaviour and Risk Assessment 城市污水處理廠污水中殘留藥物的性狀及其風險評估	NSFC/RGC 國家自然科學基金/研究資助局	PI: Lam P.K.S. Co-I: Lam, J.C.W. Co-I: Yu, H.Q.	815,701

University Grants Committee 大學教育資助委員會

	Project Title	Grant Type	Investigator(s)	Amount (HK$)
10	Nutritional Niche of *E. Coli* in Marine Sediment 大腸桿菌於海洋沉積物中的營養生態位	General Research Fund 優配研究金	PI: Lau, S.C.K. Co-I: Lam, H.	606,223
11	Metal Catalyzed Oxidation of Organic Substrates by Nitrogen Oxyanions and Oxides (2014-2016) 金屬催化含氮酸根離子以及氧化物氧化有機物	General Research Fund 優配研究金	PI: Lau, T.C.	974,193
12	Geographic and Temporal Variations in the Phylogenetic Diversity of the Marine Cyanobacteria *Synechococcus* in Estuarine and Coastal Waters of Hong Kong 海洋藍青細菌聚球藻系統多樣性在香港河口和近岸海域的時空變化	General Research Fund 優配研究金	PI: Liu, H.B.	822,731
13	Quantification of Organic Ultraviolet Filters in Hong Kong Surface Waters and Assessment of their Toxicities to Local Coral Species 有機紫外防曬劑在香港表層水體中的定量及其對本地珊瑚物種的毒性評估	General Research Fund 優配研究金	PI: Murphy, M.B. Co-I: Fan, T.Y.	369,579
14	Trophic and Growth Analysis of Marine Subtidal Gastropod Assemblages in Contrasting Subtropical Environments 不同亞熱帶環境下海洋潮下帶腹足類群落營養及生長分析	General Research Fund 優配研究金	PI: Shin, P.K.S. Co-I: Cheung, S.G.	850,444
16	Green- and Blue-Colored Oysters in the Pearl River Estuary: Metal Biodynamics, Acclimation, and Remediation 珠江口藍色和綠色牡蠣的金屬生物動力學、適應和治理	General Research Fund 優配研究金	PI: Wang, W.X.	1,299,049
17	Green Slope Engineering: Bioengineered, Live Cover Systems for Man-made Fill Slopes and Landfill Capillary Barriers in Hong Kong 香港綠色斜坡工程：人造斜坡生態複蓋系統及垃圾堆填區毛細複蓋層	Collaborative Research Fund 協作研究金	PI: Ng, C.W.W. Co-I: Tham, L.G. Co-I: Wong, M.H. Co-I: Zhang, L.M. Co-I: Zhang, Q. Co-I: Pryor, M. Co-I: Chu, L.M. Co-I: Wang, Y.H. Co-I: Hau, B.C.H. Co-I: Yan, W.	8,000,000
18	Evaluation and Comparison of Ultraviolet Radiation Exposure in High-rise City Environments 高樓城市環境中紫外線輻射水準的評估和比較	General Research Fund 優配研究金	PI: Yu, P.K.N.	491,960
	Subtotal			19,899,972

University Grants Committee 大學教育資助委員會

	Project Title	Grant Type	Investigator(s)	Amount (HK$)
		2012		
19	Centre for Marine Environmental Research and Innovative Technology 海洋環境研究與創新技術中心	Areas of Excellence Scheme 卓越學科領域計劃	PI: Wu, R.S.S.	20,500,000
20	Air-surface Exchange of Persistent Organic Pollutants (POPs) and Heavy Metals (MNs) in Peri-urban Agricultural Ecosystems of the Pearl River Delta, South China 典型持久性有機污染物和重金屬在珠江三角洲城郊農田生態系統的大氣沉降與擴散交換	NSFC/RGC 國家自然科學基金/研究資助局	PI: Li, X.D.	863,800
21	Health Risk Assessment of Toxic Trace Elements and Polycyclic Aromatic Hydrocarbons (PAHs) via Indoor Dust from Coal-burning Households 中國農村燃煤家庭室內大氣顆粒物中有毒元素與多環芳烴的健康影響	NSFC/RGC 國家自然科學基金/研究資助局	PI: Wong, M.H.	780,000
22	Sources and Biodynamics of Mercury in Marine Fish in Hong Kong Coastal Waters 香港沿海水域海洋魚體內汞的來源和生物動力學研究	General Research Fund 優配研究金	PI: Wang, W.X.	1,200,000
23	PBDE: Bioaccumulation, Maternal Transfer and Effects on Darwinian Fitness Traits in Multiple Generations of Marine Gastropod PBDE 在海洋腹足類動物多代中的積累、母體轉移及其對達爾文適合度特性的影響	General Research Fund 優配研究金	Co-I: Wu, R.S.S	764,711
24	Response of the Phytoplankton, Microzooplankton and the Prokaryotic Communities to Atmospheric Dust Deposition: an –Omics Approach 採用組學方法研究大氣灰塵沈積物對浮游植物、微型浮游動物和原核生物群落的影響	General Research Fund 優配研究金	PI: Liu, H.B.	950,000
25	Mechanistic Study on the Organotin-mediated Imposex in the Rock Shell *Thais clavigera* using RNA-sequencing Analysis (2012-2013) 採用 RNA 測序分析技術研究有機錫誘發的荔枝螺性畸形機理(2012-2013)	General Research Fund 優配研究金	PI: Leung, K.M.Y. Co-I: Qiu, J.W.	850,000
26	Oxidation Chemistry of Manganese Nitrido Complexes 氮化錳復合物的化學氧化研究	General Research Fund 優配研究金	PI: Lau, T.C.	813,750

University Grants Committee 大學教育資助委員會

	Project Title	Grant Type	Investigator(s)	Amount (HK$)
27	Integration of Biomimetic Microparticle-based Multiplexed Assays and Microfluidic Systems for High Throughput Quantitative Detection and Discrimination of Endocrine Disrupting Chemicals 聯合基於多復路分析的仿生微粒技術與微流體系統用於高通量辨別與檢測內分泌干擾物的研究	General Research Fund 優配研究金	Co-I: Yang, M.M.S.	775,000
28	Photoelectrode for (MEC) Concurrent Hydrogen Generation and Waste Organic Degradation 光電極用於微生物電解池的研究：制氫和有機廢棄物的降解	General Research Fund 優配研究金	PI: Li, X.Y.	500,000
29	The Diversity and Population Dynamics of Escherichia Coli in Response to the Dissolved Nutrients and Microbial Communities of Marine Sediment 海洋沉積物中微生物多樣性及其大腸桿菌多樣性和群體動態對溶解營養鹽的響應	General Research Fund Early Career Scheme 優配研究金傑出青年學者計劃	PI: Lau, S.C.K.	1,700,000
30	Ecology and Biodiversity of Benthic Marine Ecosystems Before and After the Trawling Ban in Hong Kong Coastal Waters (2012-2013) 香港海岸水底在拖網作業前後的生態和生物多樣性 (2012-2013)	Collaborative Research Fund 協作研究金	PI: Leung, K.M.Y. Co-I: Dudgeon, D. Co-I: Williams, G.A. Co-I: Sadovy, Y. Co-I: Li, W.K. Co-I: Lam, P.K.S. Co-I: Chu, K.H. Co-I: Li, X.D. Co-I: Qiu, J.W. Co-I: Cheung, W.W.L.	7,300,000
31	The Impact of Perinatal Exposure to Perfluoroalkyl Acids, and its Linkage to Predisposition of Metabolic Disorders in Adult Offspring 圍產期暴露于全氟羥基酸對成年子女代謝紊亂的影響及相關性	General Research Fund 優配研究金	PI: Wong, C.K.C.	1,098,250
32	A Study of Responses of the Invasive Apple Snail *Pomacea Canaliculata* to Environmental Stressors Using Shotgun Proteomics 應用鳥槍法蛋白組學研究入侵生物－福壽螺對環境脅迫因數的響應	General Research Fund 優配研究金	Co-I: Wong, C.K.C.	750,000
33	Multiple Stressor Effect of Uranium and Gamma Ray on Zebrafish 鈾和伽馬射線對斑馬魚的多重脅迫效應	PROCORE-France/Hong Kong Joint Research Scheme 法國與香港合作研究計劃	PI: Yu, P.K.N. Co-I: Cheng, S.H. Co-I: Guillermin, C.A. Co-I: Laplace, J.G. Co-I: Pereira, S.	90,000
	Subtotal			38,935,511

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	Project Title	Grant Type	Investigator(s)	Amount (HK$)
		2011		
34	Functional Analyses of HIF Transcription Factors and Associated MicroRNAs in the Human H295R Adrenocortical Cell Line 人腎上腺皮質細胞系 H295R 的 HIF 轉錄因子及其關聯微 RNAs 的功能分析研究	Areas of Excellence Scheme 卓越學科領域計劃	PI: Kong, R.Y.C.	800,000
35	Comparison of the Acute Sensitivity to Chemicals of Tropical and Temperate Aquatic Animal Species: Meta Analysis and Mechanistic Studies 整合分析與機制研究：熱帶與溫帶不同物種水生動物對化學品的急性敏感度比較	General Research Fund 優配研究金	PI: Leung, K.M.Y. Co-I: Lam, M.H.W.	710,000
36	Waterborne Viral Pathogen Detection Technologies 水源病原菌檢測技術研究	Areas of Excellence Scheme 卓越學科領域計劃	PI: Kong, R.Y.C.	200,000
37	Human Leukocyte Antigen (HLA) Homologues in Zebrafish: a Key to Understanding Hypoxia-mediated Modulation of Offspring Sex Ratios and Reproductive Functions in Fish 斑馬魚中的人白細胞抗原同系物是解釋為甚麼低氧可誘導調節斑馬魚後代性別比例以及生殖功能的關鍵	Areas of Excellence Scheme 卓越學科領域計劃	PI: Kong, R.Y.C.	100,000
38	Biokinetics, Bioavailability, and Chronic Toxicity of Metal Nanoparticles in Aquatic Organism 水生生物中金屬納米粒子的生物動力學、生物利用度以及慢性毒性的研究	General Research Fund 優配研究金	PI: Wang, W.X.	1,050,000
39	Uncovering the Molecular Links between Hypoxia and Endocrine Disruption: a Functional Study of Zebrafish Leptin 低氧與內分泌物分解之間的分子聯繫：斑馬魚瘦素的功能研究	General Research Fund 優配研究金	PI: Kong, R.Y.C.	1,000,000
40	The Functional Roles of Zebrafish irx1a Gene in Heart Development and Regeneration 斑馬魚 irx1a 基因在心臟發育和再生中的作用研究	General Research Fund 優配研究金	PI: Cheng, S.H.	820,000
41	Risk Assessment and Remediation of Cadmium Contamination in Registered Vegetable Farms in the Pearl River Delta Region 珠江三角洲區域蔬菜農場的鎘污染風險評估及其修復	General Research Fund 優配研究金	PI: Wong, M.H.	780,000

University Grants Committee 大學教育資助委員會

	Project Title	Grant Type	Investigator(s)	Amount (HK$)
42	Assessment of Benthic Community Health in Subtropical Waters Using Biological Indices and Life-trait Analysis (ongoing) 應用生物指數和生命特徵分析法評估亞熱帶海域底棲生物群落健康狀況（進行中）	General Research Fund 優配研究金	PI: Shin, P.K.S. Co-I: Cheung, S.G.	699,264
43	Measurement and Assessment of Novel Halogenated Flame Retardants in Waterbirds and Marine Cetaceans in Hong Kong 香港水域水鳥和鯨類動物中新興阻燃劑的測量和評估	General Research Fund 優配研究金	PI: Lam, P.K.S.	462,000
44	UGC AoE Sustained Funding Sub-project 大學教育資助委員會－卓越學科領域計劃維持的子研究項目	University Grants Committee 大學教育資助委員會	PI: Tam, N.F.Y.	410,000
	Subtotal			7,031,264
		2010		
45	Marine Environmental Research and Innovative Technology, MERIT 海洋環境研究與創新型技術，MERIT	Areas of Excellence Scheme 卓越學科領域計劃	PI: Au, D.W.T.	700,000
46	Automated Micro/Nano-scale Execution of Tasks with Multiple Biological Cells Using a Table-Top Robotic Bio-manipulation System 使用台式機械人生物操縱系統對多種生物細胞自動執行微/納米級任務	Competitive Earmarked Research Grant 角逐研究用途補助金	PI: Cheng, S.H.	1,484,960
47	C-H Bond Activation by Nitrido Imido and Amido Complexes of Ruthenium bearing Salen Ligands 具有 Salen 配基的钌的 Nitrido, Imido, Amido 絡合物對碳氫鍵的活化作用	Competitive Earmarked Research Grant 角逐研究用途補助金	PI: Lau, T.C.	1,115,000
48	From Genes to Behavior: the Roles of Iroquois Genes in the Development and Function of Zebrafish Embryonic Retinal Neurons 從基因至行為: Iroquois 基因在斑馬魚胚胎視網膜神經發育與功能中的作用	Competitive Earmarked Research Grant 角逐研究用途補助金	PI: Cheng, S.H.	1,034,994
49	Nanotherapeutics in Angiogenesis: Synthesis and in Vivo Assessment of Drug Efficacy and Biocompatibility in the Zebrafish Embroys 血管新生的納米療法: 合成及在斑馬魚胚胎體內評估藥物療效及生物相容性	Competitive Earmarked Research Grant 角逐研究用途補助金	PI: Cheng, S.H.	740,565

University Grants Committee 大學教育資助委員會

	Project Title	Grant Type	Investigator(s)	Amount (HK$)
50	Understanding the Relationship between Gender, Estrogen and Telomere Biology in Fish: Towards Developing an Alternative Vertebrate Model for Aging Studie 基於對魚類雌雄性別關係，雌激素與端粒生物學的瞭解開發用於研究衰老現象的新型脊椎動物模型	General Research Fund 優配研究金	PI: Au, D.W.T	730,000
51	Action Mechanisms of Endocrine Disrupting Chemicals in Fish Reproductive Axis 內分泌乾擾物對魚類生殖的作用機制	University Grants Committee 大學教育資助委員會	PI: Ge, W. Co-I: Wu, R.S.S. Co-I: AU, D.W.T.	500,000
52	UGC AoE Sustained Funding Sub-project 大學教育資助委員會-卓越學科領域計劃維持的子研究項目	University Grants Committee 大學教育資助委員會	PI: Cheng, S.H.	285,000
53	Chinese Medicine Research and Further Development 中藥研究與發展	University Grants Committee 大學教育資助委員會	PI: Cheng, S.H.	166,500
	Subtotal			6,757,019

Others 其他

	Project Title	Grant Type	Investigator(s)	Amount (HK$)
		2012		
1	Identification of Mammalian Species Used in Food by Flow-Through DNA Hybridization System 採用導流 DNA 雜交技術識別食物中哺乳動物的種類	CityU Applied Research Grant	PI: Cheng, S.H.	170,235
2	Photosynthetic and Proteomic Responses of the Marine Diatom *Thalassiosira Pseudonana* to Triphenyltin Exposure 假微型海鏈藻對三苯基錫的光合以及蛋白組學的響應研究	HKU (small project grant)	PI: Leung, K.M.Y. Co-I: Lo, C. Co-I: Leung, P.T.Y.	80,000
3	Interactions among Biodegradable Chelants, Soil Microbes, and Plant Roots in the Phytomanagement Process of Metal-contaminated Soils 金屬污染土壤植物修復中可生物降解螯和劑，土壤微生物，和植物根系的主要相互作用	Hong Kong Scholar Program 香江學者計劃	PI: Li, X.D.	600,000
	Subtotal			850,235
		2011		
4	Futian-CityU Mangrove Research and Development Centre 香港城市大學福田城大紅樹林研發中心	CityU Applied R&D Grant	PI: Tam, N.F.Y.	850,000
5	The Developmental Toxicity of UV Sunscreens 紫外光遮光劑的發育毒性研究	CityU Strategic Research Grant	PI: Cheng, S.H.	180,000
6	Understanding the Estrogen Dynamics and Longevity Gender Gap in Medaka 青鱂魚雌性激素動力學以及雌雄壽命差異的研究	CityU Strategic Research Grant	PI: Au, D.W.T.	180,000
7	An Ecological Study of Horseshoe Crab Spawning and Nursery Beach for Conservation Purposes: Ha Pak Nai, Hong Kong 香港下白泥馬蹄蟹的產卵及其哺育海灘的生態學保護研究	Ocean Park Conservation Foundation Hong Kong 香港海洋公園保育基金	PI: Shin, P.K.S.	250,000
8	Impact of Sea-level Rise on Protection and Management of Coastal Mangrove Wetland 海平面上升對沿海紅樹林濕地保護與管理的影響研究	Ocean Park Conservation Foundation Hong Kong 香港海洋公園保育基金	PI: Tam, N.F.Y.	200,115

Others 其他

	Project Title	Grant Type	Investigator(s)	Amount (HK$)
9	Conservation of Horseshoe Crabs in Ha Pak Nai, Hong Kong: Bridging Science and Community Participation (ongoing) 結合科研與社區參與的香港下白泥馬蹄蟹的保育計畫	Ocean Park Conservation Foundation Hong Kong 香港海洋公園保育基金	PI: Shin, P.K.S. Co-I: Cheung, S.G. Co-I: Kong, R.Y.C.	420,876
	Subtotal			2,080,991
	2010			
10	Time-series and Spatial Statistical Studies on Marine Water Quality Monitoring Data in Hong Kong: Implications of the Effectiveness of Environmental Policy and Management, and Definition of Water Pollution Control Zones 對香港海洋水質監測數據的時間和空間統計研究: 對環境政策及管理有效性的影響，以及水污染管制區的定義	HKU Seeding Funding for Small Project	PI: Leung, K.M.Y. Co-I: Li, W.K.	72,000
11	Smart Ambience for Affective Learning (SAMAL): An Innovative Exploration of Smart Ambience for Integrating Affect and Cognition in Learning Life Science and Information Management 智慧情境的情感學習：智慧情境對整合在學習生命科學與信息管理中產生的情感與認知的創新探索	Teaching Development Grant, CityU	Co-I: Cheng, S.H.	800,000
12	Ocean Dynamics and Modeling Program 海洋動力學以及模擬編程	Research Project Competition (HKUST)	PI: Gan, J.P.	300,000
	Subtotal			1,172,000

Grants from Mainland China 內地科研資助

Government 政府部門

	Project Title	Grant Type	Investigator(s)	Amount (RMB¥)
		2013		
1	Development, Optimization and Validation of Key Techniques for Mass culture of Toxic *Gambierdiscus* Spp. for Isolation and Purification of Ciguatoxins 用於高產雪卡毒素的有毒綱比甲藻批量養殖技術	Shenzhen Strategic Emerging Industry Development Special Fund 深圳市戰略性新興產業發展專項資金	PI: Chan, L.L.	400,000
2	Acute and Chronic Neurotoxic Actions on Brain Neuron and Astrocyte Correlated with Cognitive Deficits in Rats 急性及慢性蓄積性雪卡中毒對大鼠腦神經元、膠質細胞和腦認知功能損害的研究	Shenzhen Strategic Emerging Industry Development Special Fund 深圳市戰略性新興產業發展專項資金	PI: Li, Y. Co-I: Chan, L.L.	150,000
3	Meridional Circulation in the South China Sea 中國南海的經向環流	National Science Foundation of China Key Project 國家自然科學基金重點項目	Co-I: Gan, J.P.	1,000,000
4	Deep Ocean Biogeochemical Processes and its Coupled Physical Dynamic control on the Sir-sea CO_2 fluxes in the South China Sea 南海深部生物地球化學-物理耦合過程對海－氣介面 CO_2 通量的調控	National Science Foundation of China Key Project 國家自然科學基金重點項目	Co-I: Gan, J.P.	1,700,000
5	Assessment of antibiotics in sewage and characterization of antibiotic-degrading bacteria 城市污水中抗生素的檢測及其降解菌研究	Shenzhen Strategic Emerging Industry Development Special Fund 深圳市戰略性新興產業發展專項資金	PI: Lam, J.C.W.	200,000
6	Combined Organic Pollutants in Soils 土壤中的復合有機污染物	National Basic Research Program of China 國家重點基礎研究發展計劃項目(973 計劃)	Co-PI: Li, X.D.	4,800,000
7	Research on Long-term Efficiency of Constructed Mangrove Wetland for Wastewater Treatment and the Related Mechanisms 紅樹林人工濕地淨化系統的長期有效性及機制研究	Shenzhen Strategic Emerging Industry Development Special Fund 深圳市戰略性新興產業發展專項資金	PI: Tam, N.F.Y.	400,000
8	Metal Pollution Monitoring in PRE 珠江口的金屬污染監測	State Oceanic Bureau 國家海洋局	PI: Wang, W.X.	320,000

Government 政府部門

	Project Title	Grant Type	Investigator(s)	Amount (RMB¥)
9	Marine Environmental Science Conference and SMART Inauguration 海洋環境科學學術交流會暨深圳海洋研究與技術聯盟成立儀式	Shenzhen International Technology Cooperation and Communication Project 深圳市國際科技合作交流活動類項目	PI: Lam, P.K.S.	100,000
	Subtotal			10,250,000
		2012		
10	High Efficiency Photocatalytic and Electrocatalytic Water Splitting and Carbon Dioxide Reduction 分解水和還原二氧化碳的高效光/電催化體系研發及機理研究	Shenzhen Strategic Emerging Industry Development Special Fund 深圳市戰略性新興產業發展專項資金	PI: Lau, T.C.	600,000
11	Development of Nanotechnology-based Detection Platform for Early Diagnosis of Lung Cancer 用於肺癌早期診斷的納米技術檢測平台的建立	National Program on Key Basic Research Project of China (973 Program) 國家重點基礎研究發展計劃項目(973 計劃)	Co-I: Yang, M.M.S.	830,000
12	Biokinetics and Toxicology of Heavy Metals in Southern China Estuaries 華南河口重金屬的生物動力學與毒理學	National Science Foundation of China 國家自然科學基金	PI: Wang, W.X.	3,000,000
13	Study of the Key Factors that Influence the Flux of Ciguatera Toxins through Marine Food Webs 西加毒素在海洋食物鏈傳遞之關鍵因子研究	National Science Foundation of China 國家自然科學基金	PI: Chan, L.L.	760,000
14	Assessment and Characterization of Novel and Unknown Per- and Polyfluorinated Compounds in Pearl River and Yangtze River Delta 珠江三角洲和長江三角洲新型與未知全氟化合物污染狀況及其生態風險	National Science Foundation of China 國家自然科學基金	PI: Lam, P.K.S.	740,000
15	Assessment of Conventional & Emerging Halogenated Flame Retardants in Two Estuaries of China: Pearl River Delta and Yangtze River Delta 中國珠江與長江河口地區傳統及新興鹵系阻燃劑環境分布特徵與生態風險評估	NSFC Project for Young Scientists' Fund 國家自然科學基金青年基金	PI: Lam, J.C.W.	280,000
16	Development, Optimization and Validation of Methods for Isolation, Purification and Trace Analysis of CTXs 雪卡毒素高純度提取與痕量分析技術研究	Shenzhen Strategic Emerging Industry Development Special Fund 深圳市戰略性新興產業發展專項資金	PI: Lam, P.K.S. Co-I: Chan, L.L.	300,000

Government 政府部門

	Project Title	Grant Type	Investigator(s)	Amount (RMB¥)
17	Integrated Technology Development for Algal Bloom Online Monitoring and Development and Validations in Lake Tai 水華在線檢測設備的集成與應用示範	National Science and Technology Major Project "十二五"國家重大科技專項	PI: Lam, P.K.S.	800,000
18	Development, Optimization and Validation of Methods for Isolation, Purification and Trace Analysis of Ciguatoxins. 雪卡毒素高純度提取與痕量分析技術研究	Shenzhen Strategic Emerging Industry Development Special Fund 深圳市戰略性新興產業發展專項資金	PI: Lam, P.K.S.	300,000
	Subtotal			7,610,000
	2011			
19	Health Risk Assessment of Toxic Trace Elements and PAHs via Indoor Dust from Coal-burning Households in Rural China 中國農村燃煤家庭室內大氣顆粒物中有毒元素與多環芳烴的健康影響	National Science Foundation of China 國家自然科學基金	PI: Wong, M.H.	900,000
20	Research Centre for Ocean and Human Health 海洋與人類健康研究中心	Supporting Fund from Shenzhen Virtual University Park 深圳虛擬大學園專項扶持經費	PI: Lam, P.K.S.	400,000
21	Eco-remediation Technology and Demonstration of the Coastal Wetland in Shenzhen Bay 深圳灣濱海濕地修復技術推廣應用示範工程	Shenzhen Municipality 深圳市政府	PI: Tam, N.F.Y.	200,000
	Subtotal			1,500,000

Others 其他

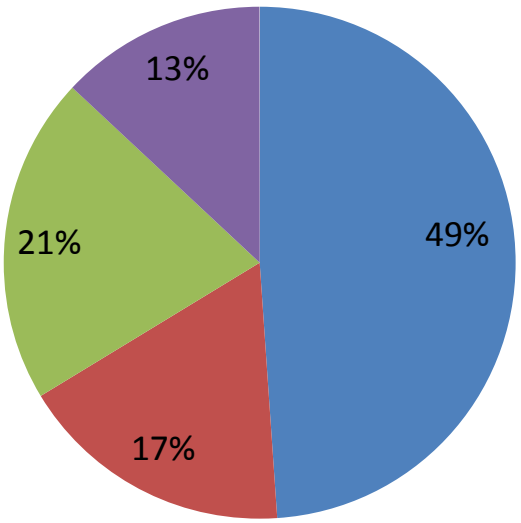
	Project Title	Grant Type	Investigator(s)	Amount (HK$)
	2012			
1	Marine Environmental Monitoring Programme for the Remediation and Development Project at the Estuary Area in the Eastern District of Shantou 汕頭市東部城市經濟帶河口治理及綜合開發項目施工期海洋環境跟蹤監察	Cooperation Program 合作項目	PI: Lam, P.K.S.	120,000
2	Determination of Antibiotic Compounds in Shenzhen Source Water 深圳水環境樣品中抗生素檢測方法開發與含量檢測	Cooperation Program 合作項目	PI: Lam, J.C.W.	190,000

Others 其他

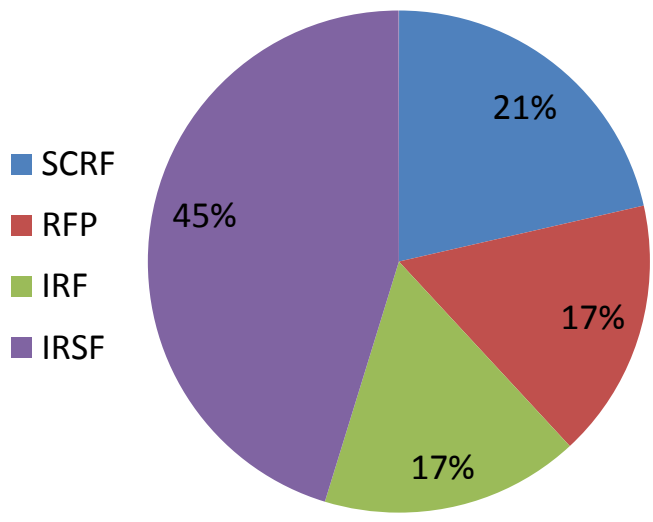
	Project Title	Grant Type	Investigator(s)	Amount (HK$)
3	Training Program for Quantification of Antibiotics in Water Samples 水環境樣品中抗生素檢測技術人員培訓	Cooperation Program 合作項目	PI: Lam, J.C.W.	60,000
	Subtotal			370,000
	2010			
4	Demonstration of Circular Economy: Study on the Eco-remediation of Shenzhen Overseas Chinese Town 循環經濟示範僑城濕地生態系統修復研究	Shenzhen Overseas Chinese Town Holding Company 深圳華僑城歡樂海岸項目	PI: Tam, N.F.Y.	1,200,000
	Subtotal			1,200,000

The SKLMP Research Grants
SKLMP 的研究資助

Allocation of SKLMP internal research grants
SKLMP 內部科研經費分配
(2010-2013)



Publications arising from SKLMP internal research grants
SKLMP 內部科研經費支持發表的論文數比例
(2010-2013)



Remarks: All publications affiliated SKLMP

Funded by CityU for Partner State Key Laboratory (PSKL)
城大國家重點實驗室內部撥款資助項目

CityU Internal Research Fellowship Programme (RFP)
城大內部博士後基金

	Project Title	Investigator	Amount (HKD$)
	Jan 2013 - Dec 2014		
1	A Holistic Approach to Unravel Xenoestrogen Induced Immunosuppressive Effects and Reproductive Impairment in Fish: Implications for Risk Assessment and Monitoring of Immunosuppressants in Waters	Au, D.W.T.	400,000
2	Comparative Investigation on Resistance and Defense Mechanism of Coral Reef Fishes to Ciguatoxins (CTXs)	Chan, L.L.	400,000
3	Significance of Roots and Microorganisms in Phytoremediation of Polybrominated Diphenyl Ethers (PBDEs) by Mangrove Plants	Tam, N.F.Y.	400,000
4	Identification of Biomarkers for Low Dose Radiation: Linking Radiation Induced Effects from Molecular to Physiological Levels	Cheng, S.H.	400,000

CityU Internal Research Fund (IRF)
城大內部研究經費

	Project Title	Investigator	Amount (HKD$)
	Jan 2013 - Dec 2014		
1	Expression of Plasma Immune Proteins is Gender-dependent and Related to Fish Susceptibility to Pathogen	Au, D.W.T.	200,000
2	Studies on Multiple Stressor Effect of Ionizing Radiation and Heavy Metals on Marine Fish Using Marine Medaka (*Oryzias Melastigma*): Towards a Realistic Risk Assessment	Yu, P.K.N.	600,000 (From SKLMP:$400,000) (From CSE:$200,000)
3	Phytoremediation of Polybrominated Diphenyl Ethers (PBDEs) by Mangrove Wetlands	Tam, N.F.Y.	200,000
4	Responses of Marine Organisms to Ocean Acidification: Does Ecosystem Matter?	Cheung, S.G.	200,000
5	Risk Assessment of Pharmaceutical Residues and Occurrence of Antibiotic-resistant Bacterial Genes and Strains in Hong Kong Surface Waters and Sediments	Murphy, M.B.	200,000
6	Development of Radiation Biodosimeter Using Transgenic Bacterial Sensor Strains Immobilized in Microfluidic Network	Cheng, S.H.	500,000 (From SKLMP:$200,000) (From CSE:$300,000)

CityU Internal Research Seed Fund (IRSF)
城大內部研究種子基金

	Project Title	Investigator	Amount (HKD$)
	Jan 2011 - Dec 2012		
1	Development of Novel Technology for Early Diagnosis and Monitoring of Immunotoxic Pollutants in Marine Environment	Au, D.W.T.	100,000
2	Quantification of Poly- and Perfluorinated Compounds (PFCs) and Species Identification of Shark Fins Purchased from Hong Kong Seafood Shops	Murphy, M.B.	200,000
	Jan 2010 - Dec 2011		
3	Development of Highly Efficient ZnO Tetrapods Nanoparticles for Photodegradation of Organic Pollutants in Water under Visible Light	Lau, T.C.	150,000
4	International Collaborative Research on Endocrine Disrupting Compounds (EDC) and Emerging Persistent Organic Pollutants (POPs) in South China Sea	Cheng, S.H.	200,000
5	Long-term Measurements of Ultraviolet Radiation in Marine Environments in Hong Kong	Yu, P.K.N.	150,000
6	Sorption and Degradation of Polybrominated Diphenyl Ethers (PBDEs) by Green Microalgae with and without the Effect of Metals	Tam, N.F.Y.	200,000
7	Unraveling Tissue-specific Mechanisms for in vivo Regulation of Estrogen Target Genes in Medaka	Au, D.W.T.	200,000

Funded by the Innovation and Technology Fund for PSKL from Innovation and Technology Commission
獲創新科技署國家重點實驗室專項基金資助的項目

SKLMP Seed Collaborative Research Fund (SCRF)
SKLMP 種子協作研究基金

	Project Title	Investigator	Amount (HKD)
	Jan 2012 - Dec 2014		
1	Assessing the Impacts of Organic and Metal Pollution on Symbiotic Microbial Communities in Marine Corals and Sponges by Metagenomics and Transcriptomics Approaches	Qian, P.Y. (HKUST) Wang, W.X. (HKUST) WU, R.S.S. (HKU) Qiu, J.W. (HKBU) Lee, O.O. (HKUST) Chiu, J.M.Y. (HKU)	900,000
2	Establishing the Green Lipped Mussel Perna viridis as a Universal Marine Model Organism and Pollution Biomonitor for Ecotoxicology and Environmental Genomics	Leung, K.M.Y. (HKU) Lam, P.K.S. (CityU) Wong, C.K.C.(HKBU) Chan, L.L. (CityU)	900,000
3	Health Risk Assessments of Residents in the Pearl River Delta exposed to Brominated Flame Retardants (BFRs)	Wong, M.H. (HKBU) Wang, H.S. (HKBU) Man, B.Y.B. (HKBU) Wu, S.C. (CityU) Lam, P.K.S. (CityU) Wong, C.K.C.(HKBU) Jones, P.D.(University of Saskatchewan, Canada) Giesy, J.P.(University of Saskatchewan, Canada)	900,000
4	Interactive Effects of Climate Change and Hypoxia on Fish Sex Determination: Estrogen synthesis and Masculinisation 2011	Kong, R.Y.C.(CityU) Wu, R.S.S. (HKU) Yu, R.M.K. (University of Newcastle, Australia)	900,000
5	Sources and Bioaccumulation of Mercury and Cadmium in the Pearl River Estuary (PRE) and Hong Kong Coastal Waters	Li, X.D. (PolyU) Wang, W.X. (HKUST)	900,000

PI publications supported by SKLMP internal research grants (2010-2013)
PI 獲 SKLMP 內部科研經費發表的論文情況 (2010-2013)

PI	SKLMP internal research grants	Funding amount (HK$)	Total funding from SKLMP (HK$)	SCI publications affiliated SKLMP			
				2010	2011	2012	2013
Au, D.W.T.	RFP IRF IRSF	400,000 200,000 300,000	900,000	/ / 0	/ / 2	0 0 2	1 1
Chan, L.L.	RFP	400,000	400,000	/	/	0	1
Cheng, S.H.	RFP IRF IRSF	400,000 500,000 200,000	1,100,000	/ 0	/ 1	0 7	4 /
Cheung, S.G.	IRF	200,000	200,000	/	/	0	0
Kong, R.Y.C.	SCRF	900,000	900,000	/	0	0	0
Lau, T.C.	IRSF	150,000	150,000	0	1	1	/
Leung, K.M.Y.	SCRF	900,000	900,000	/	0	1	1
Li, X.D.	SCRF	900,000	900,000	/	0	0	0
Murphy, M.B.	IRF IRSF	200,000 200,000	400,000	/ 0	/ 0	0 0	0 0
Qian, P.Y.	SCRF	900,000	900,000	/	0	0	0
Tam, N.F.Y.	RFP IRF IRSF	400,000 200,000 200,000	800,000	/ / 0	/ / 0	0 0 2	1 0 2
Wong, M.H.	SCRF	900,000	900,000	/	0	0	7
Yu, P.K.N.	IRF IRSF	600,000 150,000	750,000	/ 0	/ 0	2 /	4 /

Remarks: Results based on research output provided by members

Summary of the Research Fellowship Programme (RFP) Projects

RFP 項目概要

Apr 2013 – Mar 2015 (Ongoing)

A HOLISTIC APPROACH TO UNRAVEL XENOESTROGEN INDUCED IMMUNOSUPPRESSIVE EFFECTS AND REPRODUCTIVE IMPAIRMENT IN FISH: IMPLICATIONS FOR RISK ASSESSMENT AND MONITORING OF IMMUNOSUPPRESSANTS IN WATERS

體研究方法揭示外源性雌激素引起的免疫抑制及對生殖系統的影響：對風險評估和監控水體中免疫抑制物的提示

Doris Wai Ting AU, Terrance Chi Kong LAU, Joseph Liam HUMBLE

Earlier studies on chronic toxicity of xenoestrogens or estrogen active chemicals (EACs) in fish were largely focused on adverse outcomes related to reproductive impairment. An increasing number of field and laboratory studies have shown that many EACs in environment could depress the expressions of major immune proteins and increase fish susceptibility to pathogens. The findings support the immunosuppressive role of EACs in fish. Surprisingly, no studies have ever been conducted to evaluate the manifestation of EACs induced adverse effects on fish immune function and reproduction concomitantly in the same fish population. Moreover, the mechanisms by which EE2 (a model EAC) impairs immune function in male and female fish are virtually unknown. Such information is crucial for a holistic assessment of the risk of EACs in waters.

The marine medaka (*Oryzias melastigma*) has recently been established as a model fish for immunotoxicoloogy. Here, we exposed adult marine medaka to a range of environmentally relevant concentrations of EE2 and assessed the effects upon the immune and reproductive systems, using a suite of molecular, physiological and whole organism endpoints. The results of range finding experiment and definitive experiments indicate the NOEC and LOEC at which EE2 impairs the immune and reproductive systems. Gender dependent responses regarding reproductive dysfunction and immune impairment were also compared, which revealed the existence of sex specific effects of EE2 on immune competence of marine medaka. Liver samples of female medaka were employed for next generation sequencing (NGS) analysis to identify differentially expressed genes involved in key immune and reproduction pathways that were deregulated by EE2. Interesting, several key complement system genes involved in the innate immune function were identified as down-regulated and these are considered potential novel biomarkers for immune suppression in the marine medaka. The hepatic transcriptomic data also revealed the major biological processes that were affected by EE2 exposure in female medaka, including the biochemical pathways related to amino acid and sugar metabolism as well as xenobiotic bio-transformation.

早期關於外源雌激素或雌激素活性化學物（estrogen active chemicals , EACs）對魚類慢性影響的研究主要著重於其對生殖系統的不良後果。越來越多的實驗室和野外實驗證明許多雌激素活性化合物可以抑制主要免疫蛋白的表達和影響魚類對病原物的抵抗力。這些發現證實了雌激素活性化合物對魚類免疫系統的影響。然而，在同一條件下雌激素化合物對同一群體魚類免疫和生殖功能影響的研究卻一直缺失。而且，雌激素活性化合物對雌魚和雄魚免疫功能的影響的具體機理也未知。這些資訊都對雌激素活性化合物的整體風險評價非常重要。

近年來海洋青鱂(*Oryzias melastigma*)被建立為模式魚類用於免疫毒理的研究中。在此，我們用一系列環境相關濃度的人造雌激素 EE2 暴露海洋青鱂，然後用不同分子、生理和整魚水準的參數評價對免疫和生殖功能的影響。系列濃度實驗和限定濃度實驗結果可以提供 EE2 影響免疫和生殖功能的無可觀察

RFP

到反應的最高量（NOEL）和可觀察到反應的最低量（LOEL）。我們比較了不同性別魚類的生殖和免疫功能，發現了 EE2 對海洋青鱂有性別特異性影響。我們用第二代測序技術對 EE2 暴露和對照組雌魚肝臟的轉錄組進行測序，識別出被 EE2 抑制的參與免疫和生殖功能的差異表達基因。結果表明天然免疫中的重要的補體基因表達被下調，這些補體基因可以被用作海洋青鱂受到免疫抑制的重要新的生物指標。肝臟轉錄組資料也表明許多主要的生化過程受到了影響，包括了氨基酸、糖類代謝以及外源物生物轉化通路。

Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

1. Yu, W.K., Fong, C.C., Chen, Y., van de MERWE, J.P., Chan, A.K.Y., Wei, F., Bo, J., Ye, R.R., Au, D.W.T., Wu, R.S.S, Yang, M.M.S. (2013)
   Gender-specific transcriptional profiling of marine medaka (*Oryzias melastigma*) liver upon BDE-47 exposure. *Comparative Biochemistry and Physiology Part D: Genomics and Proteomics*, 8:255-262.

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊：

Nil

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊：

Nil

Papers with the SKLMP partial support SKLMP 部份參與的期刊論文：

Nil

RFP

Jan 2013 – Dec 2014 (Ongoing)

COMPARATIVE INVESTIGATION ON RESISTANCE AND DEFENSE MECHANISM OF CORAL REEF FISHES TO CIGUATOXINS

珊瑚礁魚類對雪卡毒素的抗性和防禦機制比較研究

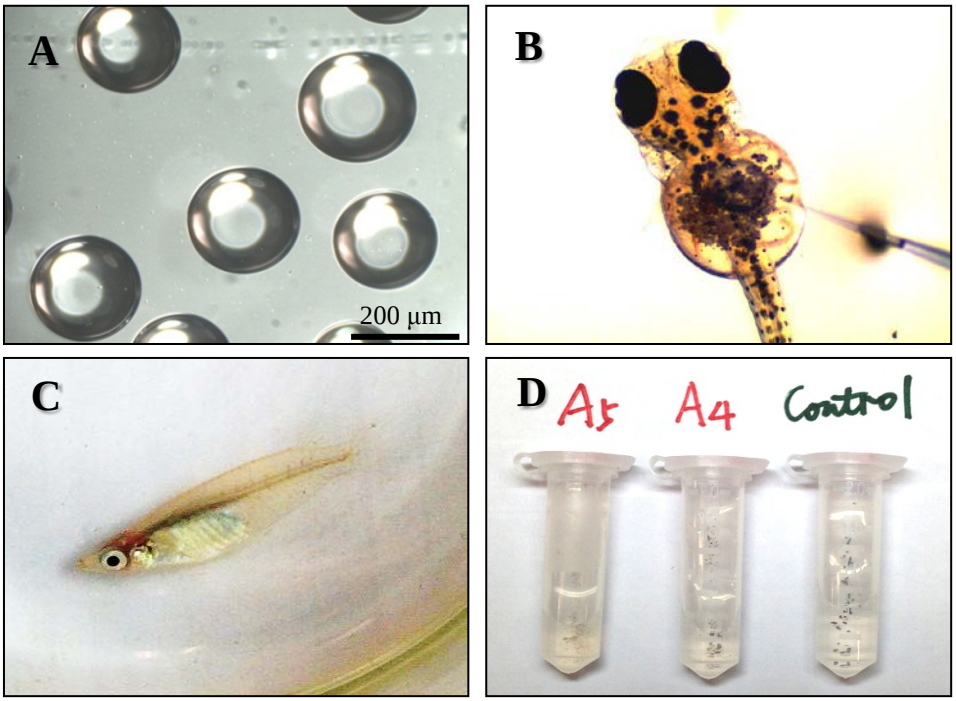
Leo Lai CHAN, Yim Ling MAK, Meng YAN

Ciguatoxins (CTXs) are a group of natural marine biotoxins that are commonly found in marketed coral reef fishes. They are of great concerns as consumption of CTX-contaminated coral reef fishes can induce ciguatera fish poisoning (CFP) in human. Because of global warming and an increase in nutrient input in the marine environment, there is a growing likelihood of CTX-causative dinoflagellates, and hence CTXs spreading into new regions of the globe. More importantly, CTXs may negatively affect wildlife since a laboratory study has demonstrated that CTX-exposed fish embryos exhibited cardiovascular, muscular and skeletal abnormalities. A reduction of larval survivability in fishes was also observed when greater CTX levels were exposed to fish embryos. Additionally, mortality of piscivorous marine mammals such as Hawaiian monk seals was reported in a CFP-prone area in Hawaii. CTXs may therefore represent an unrecognized threat to marine life and eventually pose an ecological risk to coral reef system in the CFP-prone regions. Based on the P-CTX-1 exposure study, we have defined orange-spotted grouper (*Epinephelus coioides*) and marine medaka (*Oryzias melastigma*) as the CTX-resistant and CTX-sensitive fishes, respectively. Study on the pharmacokinetics (i.e. accumulation, subsequent change in tissue distribution and elimination of CTXs) of CTXs in orange-spotted grouper and marine medaka will be conducted in order to provide insight on species-specific variations in physiological mechanisms that render CTX-resistant coral reef fishes ability to mediate harms after CTX exposure. The study of genomic and the complementary DNA sequence of the excitable tissue such as nerve, skeletal muscle, brain and heart of CTX-resistant and sensitive coral reef fish species will also be carried out to

understand the molecular basis of the defense mechanism of fishes against CTXs. All the results will provide systematic scientific information for clarifying the role of CTXs to act as natural selection agents which can result in long-term changes of coral reef community and ecosystems.

雪卡毒素(CTXs)是一類常見於市售珊瑚礁魚中的天然海洋生物毒素。因食用受污染的珊瑚礁魚而引起的人類雪卡毒中毒(CFP)事件與 CTXs 有密切相關。由於全球氣候變暖和投放海洋環境中的營養物質增加，產毒甲藻以至 CTXs 有日益增長和擴散至全球新地區的可能性。更重要的是，自實驗室研究論證了 CTXs 暴露於魚胚胎中表現出心血管、肌肉和骨骼異常現象，CTXs 極有可能對野生生物產生不利影響。同時還觀察到當使用更高濃度的 CTXs 暴露于魚胚胎時，幼魚的存活率降低。此外，肉食性海洋哺乳類動物(如夏威夷僧海豹)的死亡在夏威夷的一個 CFP 多發地區已有報導。因此，在 CFP 多發地區，CTXs 對於海洋生物是可代表一種未確認的威脅，並最終引起珊瑚礁體系的生態風險。在本研究中，我們已在實驗室研究基礎上證明了點帶石斑魚(*Epinephelus coioides*)及海水青鱗魚(*Oryzias melastigma*)分別為對 CTXs 有抗性和敏感的魚類。我們將探討 CTXs 在點帶石斑魚及海水青鱗魚的藥代動力學(即 CTXs 的積累，在組織中的分佈和消除的隨後變化)，以便瞭解有抵抗力的魚類在調節 CTXs 危害的生理機制是否存在物種特異性變異。另外，我們將開展基因組和互補 DNA 序列研究以闡明對 CTX 有抗性和敏感的珊瑚礁魚類的興奮組織 (如神經，骨骼肌，大腦和心臟) 對 CTXs 的防禦機制。所有的結果將提供有系統的科學資訊來明確 CTXs 在珊瑚礁群落和生態系統長期變化及自然選擇中所扮演的角色。

RFP



The procedure of microinjection and observation of medaka exposure to P-CTX-1

A. Injection volume was regulated by gas pressure; the sphere is about 200 µm in diameter (i.e. 4.19×10^{-12} ml per larva)

B. Inject the P-CTX-1 solution to medaka larvae by a micro-pump.

C. a female adult medaka suffering from body imbalance and sink;

D. the excrement of sick medaka (A4 and A5) and normal excrement

Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

1. Mak, Y.L., Wai, T.C., Murphy, M.B., Chan, W.H., Wu, J.J., Lam, J.C.W., Chan, L.L., Lam, P.K.S. (2013) Pacific ciguatoxins (P-CTXs) in food web components of coral reef systems in the Republic of Kiribati. *Environmental Science and Technology*, 47: 14070-14079.

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊：

1. Tian, L., Cheng, J.P., Chen, X.P., Cheng, S.H., Mak, Y.L., Lam, P.K.S., Chan, L.L., Wang, M.F. (2014) Early developmental toxicity of saxitoxin on medaka (*Oryzias melastigma*) embryos. *Toxicon* 77:16-25.

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊：

Nil

Papers with the SKLMP partial support SKLMP 部份參與的期刊論文：

Nil

Jan 2013 – Dec 2014 (Ongoing)

IDENTIFICATION OF BIOMARKER FOR LOW DOSE RADIATION: LINKING RADIATION INDUCED EFFECTS FROM MOLECULAR TO PHYSIOLOGICAL LEVELS.

低劑量輻射生物標記的鑒定：放射性誘導的分子和生理層面影響之間的聯繫

Shuk Han CHENG, Jinping CHENG

RFP

The Tsunami-driven accidental meltdown of the Fukushima Dai-ichi nuclear power plant (NPP) has illustrated the wide-ranging effects on the marine ecosystems associated with airborne fallout over the ocean and oceanic discharge of radionuclides found in contaminated water. Hong Kong receives part of its electricity supply from the Daya Bay nuclear plant, one of the first commercial NPP operated by the China Guangdong Nuclear Power Group. It is known that this Nuclear Power Group is planning to build over 20 more NPP in Guangdong, posing an ever increasing need for research on the radioecology in marine pollution. Among the radionuclides, the Americium-241 and Plutonium-240 are alpha emitters commonly found in nuclear reactors and in nuclear explosions. Their much longer decay half lives (at 432 years and 6,563 years respectively), compared to the gamma emitter Cesium-137 (at 30 years) means that these alpha emitters persist much longer in the environment. The alpha particles have much larger relative biologic effectives, at about 20 times when compared to beta particles and gamma ray photons. Alpha particles are highly radiotoxic when ingested or come into direct contacts, generating reactive oxygen species and double strand DNA breaks. However it is very difficult to monitor by the equipment due to its short range. Therefore, special efforts will be required to monitor their existence and to determine both biological and ecological consequences under realistic exposure. With this seed funding, we will gather the biological data to measure a biological relevant endpoint under conditions of alpha particle exposures and co-stressors. This exploratory project will enable us to design a transgenic zebrafish to be used to perform biomonitoring of alpha particles in seawater and its potential effects with mixtures of stressors such as metals and endocrine disruptors.

海嘯造成的日本福島第一核電站核心熔融事故向人們展示了通過大氣散播的放射性塵埃和放射性污水的排放入海對海洋生態系統大範圍的影響。香港的部分電力供應來自中廣核集團運營的第一個商業化核電站，廣東大亞灣核電站。該集團計畫在廣東建立超過 20 個核電站，對於海洋污染的放射生態學研究迫在眉睫。在所有的放射性物質中，鎿-241 和鋦-240 是核裂變反應堆和核爆炸中常見的 α 放射源。它們具有很長的半衰期（分別為 432 年和 6563 年），相比銫-137（半衰期 30 年）這類 γ 放射源，α 放射源會在環境中停留較長時間。此外，α 粒子具有較高的相對生物效應，大約是 β 粒子和 γ 射線的 20 倍。當攝入和直接接觸時，α 粒子具有很強的放射毒性包括產生活性氧類物質和造成雙鏈 DNA 斷裂。由於穿透能力弱，這類放射污染目前仍然很難用儀器檢測。因此需要將更多努力集中於研究如何檢測該物質的存在和測量其真實環境條件暴露後產生的生物學及生態學後果。利用這個子專案，我們會收集生物學資料用於測量 α 粒子和其他環境因數暴露過後的相關生物學終點。這個探索性的項目將會有助於我們設計轉基因斑馬魚作為生物檢測器，用於檢測海水中的 α 放射污染以及與其他環境壓力共同作用時的潛在影響，例如重金屬和內分泌干擾物污染。

Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

Nil

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊：

1. Choi, V.W.Y., Ng, C.Y.P., Kobayashi, A., Suya, N., Ishikawa, T., Cheng, S.H., Yu, K.N. (2013)
   Bystander Effect between zebrafish embryos in vivo induced by high-dose X-rays.
   Environmental Science and Technology, 47:6368-6376.
2. Choi, V.W, Konishi, T., Oikawa, M., Cheng, S.H., Yu, K.N. (2013)
   The threshold number of protons to induce adaptive response in zebrafish embryos.
   Journal of Radiological Protection, 33:91-100.
3. Ng. C.Y., Choi, V.W., Lam, A.C., Cheng, S.H., Yu, K.N. (2013)
   The multiple stressor effect in zebrafish embryos from simultaneous exposure to ionizing radiation and cadmium. *Journal of Radiological Protection*, 33:113-121.
4. Choi, V.W.Y., Ng, C.Y.P., Kong, M.K.Y., Cheng, S.H., Yu, K.N. (2013)
   Adaptaive response to ionizing radiation induced by cadmium in zebrafish embryos.
   Journal of Radiological Protection, 33:101-112.

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊：

Nil

Papers with the SKLMP partial support SKLMP 部份參與的期刊論文：

Nil

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May 2013 – Apr 2015 (Ongoing)

SIGNIFICANCE OF ROOTS AND MICROORGANISMS IN PHYTOREMEDIATION OF POLYBROMINATED BIPHENYL ETHERS (PBDES) BY MANGROVE PLANTS (AREA D: POLLUTION CONTROL AND BIOREMEDIATION)

紅樹植物根系及其根際微生物對多溴聯苯醚的植物修復功能及機制

Nora Fung Yee TAM, Hai Chao ZHOU

Toxic, recalcitrant and newly emerged organic pollutants such as polybrominated biphenyl ethers (PBDEs) are common contaminants in coastal sediments, and their carcinogenic properties have led to increasing attention on their remediation. Over the last few decades, phytoremediation has been suggested as an innovative, non-intrusive and inexpensive technology that utilizes plant systems and associated microorganisms to remove toxic contaminants from the environment. Previous work on phytoremediation, however, focused mainly on the uptake and accumulation of pollutants (mostly heavy metals) within tissues of terrestrial plants. Little is known about the phytoremediation of toxic organic pollutants by wetland plants in coastal environments. Unlike metal removal, the most significant phytoremediation process for organic pollutants such as PBDEs is rhizosphere degradation, the breakdown of pollutants by microorganisms in the root zone environment (the rhizosphere). Because coastal wetland plants are subject to tidal flushing with alternating aerobic and anaerobic environments which support both aerobic and reductive transformation/degradation of PBDEs. Wetland plants are also known to transfer oxygen from the above-ground tissue to the roots for internal respiration. Excess oxygen is released to the surroundings (rhizosphere) to provide aerobic pockets for microorganisms to degrade pollutants and the formation of iron plaque, which could immobilize pollutants on root surface and uptake. However, the roles of roots and the rhizosphere effects of wetland plants, such as mangroves, have never been explored. The proposed study therefore aims to investigate the significance of roots, including the effects of roots in releasing oxygen to create an aerobic environment in the rhizosphere, the formation of iron plaque on root surface, the roles of root exudates on the degradation, mobility, bioavailability of PBDEs, the selection of PBDE-degraders and the changes of the microbial community structure in rhizosphere and bulk sediments during phytoremediation by mangrove plants. The detailed functions of roots in different mangrove plant species on the remediation of coastal sediments contaminated with PBDEs will be compared. The results from the proposed work will provide a thorough scientific understanding on the significance and mechanisms of mangrove roots, the rhizopshere and the associated microorganisms in the cleanup of coastal sediments contaminated with PBDEs.

多溴聯苯醚（Polybrominated Biphenyl Ethers, PBDEs）是海岸河口沉積物普遍存在的一類新型的具有持久性、高毒性和致癌性的有機污染物。因此，其相應的環境修復手段日益被人們所關注。在過去數十幾年中，植物修復技術，即利用植物-微生物系統去除環境中有毒污染物的技術，已被認為是一種具有創新性、非入侵性和低廉的生物修復技術。然而，先前植物修復的相關研究工作主要集中在陸生植物對污染物，特別是重金屬的吸收和富集。鮮有關於利用水生濕地植物對有機污染物的植物修復相關報導。與重金屬去除機制不同，有機污染物的植物修復機制主要是植物根際降解，特別是在根際微生物群落的參與下對有機污染物，如 PBDEs 的降解。河口海岸濕地植物生長於週期性的潮水漲落生境，形成了有氧和厭氧的交替環境，從而為 PBDEs 的有氧和厭氧還原性降解過程提供了必要的環境條件。濕地植物通過組織呼吸過程把氧氣從地上部分組織傳輸到根系。過量釋放到根際的氧氣促進了微生物有氧降解污染物和根系鐵膜的形成，根系鐵膜能起到固定並吸收污染物的作用。然而，相關的濕地紅樹植物的根系和根際效應尚未進行研究探討。本研究旨在探討利用紅樹植物修復降解 PBDEs 過程中植

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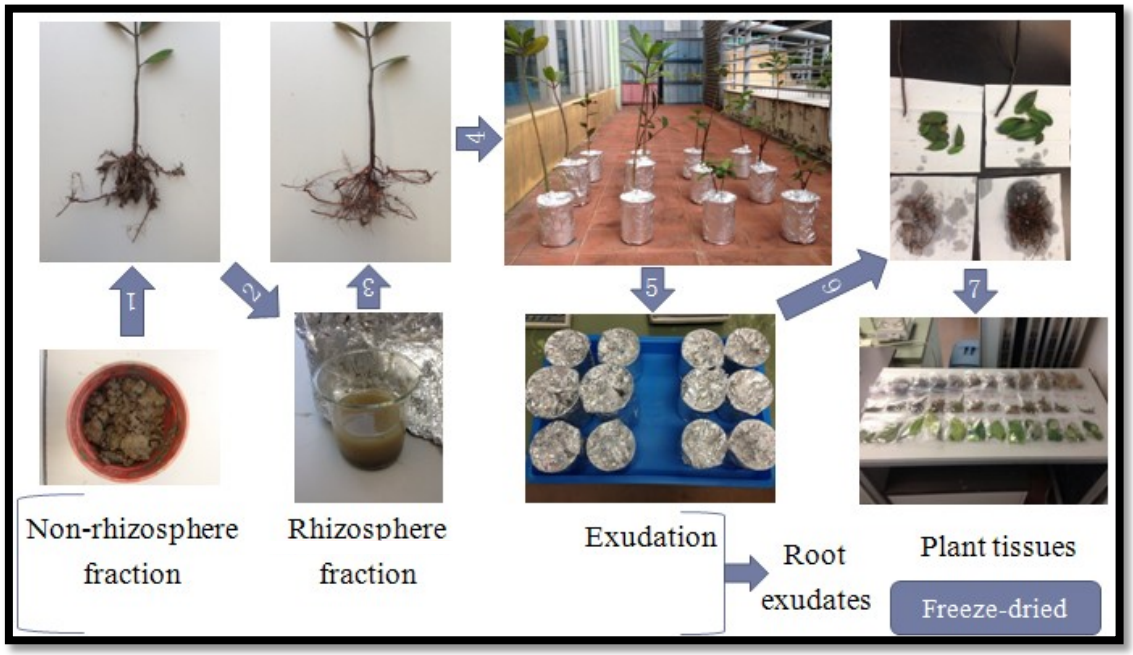
物根系的作用，包括以下幾部分：1.根系在釋放氧氣並形成根際有氧降解環境的作用；2.根系表面鐵膜的形成機理過程；3.根系分泌物對 PBDEs 的降解、轉移和生物利用過程的作用；4.沉積物和根系微生物群落結構的變化，及篩選降解 PBDEs 的目標微生物；5.分析比較不同的紅樹植物在修復降解河口海岸沉積物 PBDEs 過程的根系功能的特異性。本研究的預期結果將為揭示紅樹植物根系及其根際微生物在降解河口海岸沉積物 PBDEs 的作用和機理提供詳細深入的科學理論依據。



The procedure established for collection of root exudates and plant tissues of mangrove plants after grown in PBDE-contaminated sediment

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Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

Nil

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊：

1. Zhu, H.W., Wang, Y., Wang, X.W., Luan, T.G., Tam, N.F.Y. (2014)
   Distribution and accumulation of polybrominated diphenyl ethers (PBDEs) In Hong Kong mangrove sediments. *Science of Total Environment,* 468-469:130-139.
2. Wang, Y., Zhu, H.W., Tam, N.F.Y. (2014)
   Polyphenols, tannins and antioxidant activities of eight true mangrove plant species in South China. *Plant and Soil,* (in press)

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊：

Nil

Papers with the SKLMP partial support SKLMP 部份參與的期刊論文：

Nil

Summary of the Internal Research Fund (IRF) Projects

IRF 項目概要

Apr 2013 – Mar 2014 (Ongoing)

EXPRESSION OF PLASMA IMMUNE PROTEINS IS GENDER-DEPENDENT AND RELATED TO FISH SUSCEPTIBILITY TO PATHOGEN

血漿中免疫蛋白性別特異性的表達及其與魚類對病原物易感性的關係

Doris Wai Ting AU, Yun Wah LAM, Joseph Liam HUMBLE

In teleost fish, the innate immune system serves as the first line of host defense to pathogens before the adaptive immune system is ready and potent enough to take over. The plasma immune proteins are known to be important functional components of the innate and adaptive immune system. Fish complement system is a highly important part of their innate immune system. Gender- and age- dependent expressions of plasma immune proteins, in particular the complement system proteins, are important consideration for assessing host's resistance to microbial infection. Using the marine medaka as a fish model, the present study aims to investigate the plasma proteome and identify meaningful immune proteins that can be link to fish susceptibility to pathogens. The relationship between fish age and gender with immune function was first investigated, by subjecting marine medaka at different age groups (21 days, 4, 6 and 10 months old) to pathogenic bacteria (*E. tarda*) challenge, and fish mortality was monitored. At all of the adult age groups, a gender dependent difference in vulnerability was evident. In addition, fish of different age groups differed in their resistance to bacterial challenge. Aiming to identify and characterize plasma immune proteins in the marine medaka, here we developed and applied a method to characterize the plasma proteome using one-dimensional polyacrylamide gel electrophoresis and high performance liquid chromatography tandem mass spectrometry. The mass spectrometry data will be used to provide a catalogue of plasma proteins, which will serve as useful reference for future functional studies.

血漿中蛋白是天然和獲得性免疫系統中具有重要功能的組成部分。魚類有原始的獲得性免疫系統，而補體系統是整個免疫系統中的重要的組成部分。補體系統蛋白能抵禦細菌侵染，它的表達存在性別和年紀的特異性，能作為的重要的生物標記。但是，如今還沒有關於魚類血漿蛋白質組的相關報導。為了研究魚類年齡以及性別和免疫功能的關係，我們利用海洋青鱂作為模式生物，選取了 3 周，4 個月，6 個月和 10 個月的魚用細菌侵染進行了宿主抵禦實驗，並觀察死亡率。在成魚階段的實驗中，雌魚都比雄魚易感性更高。而且，6 個月和 10 個月成魚比 4 個月的成魚對細菌抵抗力更高。我們利用了用一維聚丙烯醯胺凝膠電泳和高效液相色譜 - 串聯質譜法識別和描述了海洋青鱂血漿中的免疫蛋白。質譜資料能作為將來功能性研究重要的參考。

Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

1. Yu, W.K., Fong, C.C., Chen, Y., van de MERWE, J.P., Chan, A.K.Y., Wei, F., Bo, J., Ye, R.R., Au, D.W.T., Wu, R.S.S, Yang, M.M.S. (2013)
   Gender-specific transcriptional profiling of marine medaka (*Oryzias melastigma*) liver upon BDE-47 exposure. *Comparative Biochemistry and Physiology Part D: Genomics and Proteomics*, 8:255-262.

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊：

Nil

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊：

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Papers with the SKLMP partial support SKLMP 部份參與的期刊論文：

Nil

Jan 2012 – Dec 2014 (Ongoing)

DEVELOPMENT OF RADIATION BIODOSIMETER USING TRANSGENIC BACTERIAL SENSOR STRAINS IMMOBILIZED IN MICROFLUIDIC NETWORK

將轉基因細菌感應株固定於微流控芯片發展而成的電離輻射生物劑量計

Shuk Han CHENG, Peter Kwan Ngok YU

IRF

Using of nuclear energy poses an ever-increasing need for research on the radioecology and safety. Ionizing radiation will ionize the water molecules inside the cells and generates reactive oxygen species (ROS) and double-strand DNA breaks (DSBs), which may lead to mutation accumulation and cancer. Specifically, the alpha radiation has much stronger ionizing power and larger relative biologic effectiveness, at about 20 times when compared to beta particles and gamma ray photons. They are highly radiotoxic when ingested or come into direct contacts, like drinking contaminated water.

It was realized that traditional physical monitoring devices would not be able to assess the actual bio-effects caused by the ionizing radiation, especially alpha radiation, due to short range of alpha radiation and the complex biological processes involved. Previous studies showed that radioactive contamination of water sources might lead to radionuclide accumulation in the biota and enter our food chain. With the increasing public concern on health issues, development of a bio-monitoring system, especially for alpha radiation contamination is highly beneficial.

Transgenic technology has been widely used for monitoring environmental pollution recently. A biomonitoring system combining transgenic technology and microfluidic technology can overcome the limitations of most of the physical radiation dosimeters as it can provide information of biological responses, such as oxidative stress and predict the potential hazard to radiation, especially alpha radiation. In this project, transgenic engineering was applied to generate transgenic bacteria for radiation monitoring. We would like to develop an on-chip radiation biodosimeter using transgenic bacteria *Deinococcus radiodurans*, which is extremely radioresistant. *D. radiodurans* have a quick transcriptional response to radiation, showing that it is sensitive enough to be used as an ideal radiation bio-indicatior. The small size of *D. radiodurans* allows the detection of alpha radiation. Different transgenic bacteria strains expressing various fluorescent proteins under the control of the different transcriptional promoters will be generated. The transgenic bacteria strains will be irradiated by alpha radioisotope, and the strains with the highest sensitivity and specificity will be selected and immobilized in the microfluidic chip and will further develop as a prototype. This prototype will be tested and validated with water sample containing alpha-radionuclides in the Institut de Radioprotection et de Sûreté Nucléaire (ISRN) in France.

對於核能利用的放射性生態學研究和安全性研究需求日益增加。電離輻射會將細胞中的水分子電離，生成活性氧和 DNA 雙鏈斷裂，從而導致突變累積和癌症。α 輻射擁有更強的電離能力和相對生物效應，大概為 β 粒子和伽馬光子的 20 倍。攝入和直接接觸，如飲用輻射污染水，都會產生強放射毒性。

傳統的物理監測裝置無法評估電離輻射引起的生物效應，特別是 α 輻射的電離效應，這是由於 α 輻射的射程短，並且其導致的生物效應包括了大量複雜的生物過程。已有研究發現，放射性污染水源會導致生物放射性核素累積而進入食物鏈。隨著公眾對健康問題關注度的提升，發展放射性污染的生物監測系統，特別是 α 輻射的生物監測系統是十分有益的。

近年來，轉基因技術被廣泛應用於環境污染監測領域。將轉基因技術與微流控技術結合而發展出的生物監測系統可以克服大部分物理輻射劑量計的缺陷，因為這一監測系統可以提供生物回應方面的資訊，如氧化應激和預測輻射污染，特別是 α 輻射的潛在危害。在本專案中，我們利用轉基因工程發展出轉基因細菌進行輻射監測，希望利用轉基因耐輻射球菌研製出輻射劑量計晶片。耐輻射球菌對輻射有快速的轉錄回應，這種高靈敏度使其成為理想的輻射生物指示物。耐輻射球菌體積小，因而可以檢測 α 輻射。我們將利用不同的轉錄啟動子控制不同的螢光蛋白表達，從而發展出不同的轉基因菌株。用 α 放射性同位素輻照轉基因細菌，將具有最高靈敏性和特異性的菌株固定於微流控晶片，並進一步發展成監測系統原型。我們將在法國輻射防護與核安全研究院，利用 α 放射性核素污染的水樣檢測和驗證該監測系統。

IRF

Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

Nil

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊：

1. Choi, V.W.Y., Ng, C.Y.P., Kobayashi, A., Suya, N., Ishikawa, T., Cheng, S.H., Yu, K.N. (2013)
   Bystander Effect between zebrafish embryos in vivo induced by high-dose X-rays.
   Environmental Science and Technology, 47:6368-6376.
2. Choi, V.W., Konishi, T., Oikawa, M., Cheng, S.H., Yu, K.N. (2013)
   The threshold number of protons to induce adaptive response in zebrafish embryos.
   Journal of Radiological Protection, 33:91-100.
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   The multiple stressor effect in zebrafish embryos from simultaneous exposure to ionizing radiation and cadmium. *Journal of Radiological Protection*, 33, 113-121.
4. Choi, V.W.Y., Ng, C.Y.P., Kong, M.K.Y., Cheng, S.H., Yu, K.N. (2013)
   Adaptaive response to ionizing radiation induced by cadmium in zebrafish embryos.
   Journal of Radiological Protection, 33:101-112.

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊：

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Nil

Nov 2012 – Oct 2014 (Ongoing)

RESPONSES OF MARINE ORGANISMS TO OCEAN ACIDIFICATION: DOES ECOSYSTEM MATTER?

不同生態系統中的海洋生物對海洋酸化的反應的比較

Siu Gin CHEUNG, Paul Kam Shing SHIN

A large proportion of the carbon dioxide (CO2) released into Earth's atmosphere by human activities is absorbed by the oceans. When dissolved in water, CO2 forms carbonic acid, increasing the concentration of H+ (hydrogen ion) and lowering the pH in ocean waters. Under the Intergovernmental Panel on Climate Change (IPCC) future CO2 emission scenarios, a drop in ocean pH of up to 0.5 units by 2100 has been predicted with "*with a high level of confidence*". There is a growing concern of the effect of ocean acidification on marine organisms with relevant publications increasing gradually in recent years. Recent data suggest that ocean acidification impacts the performance of marine organisms via changes in calcification rates (a drop in pH will cause a corresponding decrease in carbonate saturation level, adversely affecting organisms with calcified shells) and other physiological responses. Acidification, however, does not occur in isolation but in concert with other stresses, such as warming and reduced salinity. Few studies, however, have examined the interactive effect of acidification and other direct or indirect results of global change, which may aggravate the effect of ocean acidification on marine organisms.

Intertidal species are subjected to greater fluctuations in temperature, salinity, pH, etc. Therefore, they are expected to develop greater tolerances to environmental changes, for example, ocean acidification. As far as we know, no study has been carried out to test this hypothesis. Most of the previous studies on ocean acidification only focused on a single species or compared closely related species in the same habitat. If the hypothesis is correct, this helps us predict relative tolerances of closely-related species based on the environment they inhabit. Besides, it implies that intertidal communities may be more resistant to ocean acidification than subtidal communities. We propose to test the above hypothesis by comparing two species of nassariid gastropods in the same genus. One of them is intertidal species whereas the other is subtidal. The combined effects of ocean acidification and low salinity on the physiological responses, as well as growth and development of critical life stages of key species will be investigated. The substantial improvements made by the proposed research efforts to the existing predictive framework will be central to the management and conservation of living marine ecosystems in the face of climate change.

海洋吸收了大部分人類活動所產生並釋放到空氣中的二氧化碳。二氧化碳溶解于水中會產生碳酸，導致氫離子的濃度增加，從而降低海水的 pH。根據跨政府氣候變化委員會（IPCC）對於未來二氧化碳排放情況的預測，到 2100 年，海水的 pH "極有可能出現" 下降 0.5 個單位的情況。海洋酸化對於海洋生物的影響吸引了越來越多的注意力，相關的文獻數量在近年來也在逐步地持續增長。目前的資料顯示，海洋酸化影響海洋生物的鈣化率（pH 的下降會導致碳酸鹽的飽和度降低，從而對鈣化的有殼動物產生不利影響）和其他一系列生理過程。更重要的是，酸化並不是單獨發生的，而是與其他問題協同發生，比如海洋變暖和鹽度降低。少量文獻研究了海洋酸化和其他直接的或者間接的氣候變化的後果的協同作用，這些變化可能加劇海洋酸化對海洋生物的影響。

潮間帶的生物面對更大範圍的溫度，鹽度和 pH 等條件的變化。因此，研究者預計他們面對環境變化，比如海洋酸化時會有更好的耐受性。據我們目前所知，還沒有任何研究檢驗過這個假設。之前的大多數文章都只關注一個物種，或者比較生活在同一環境的相近物種。如果我們的預測是正確的，那麼這

個研究會幫助我們更好地預見基於相似生活環境的相近物種可能具有的相關耐受性。另外，研究表明潮間帶物種群落可能比潮下帶群落的抗壓能力更強。我們希望通過比較同一個屬中的兩種織紋螺來驗證上述的假設，其中一種生活在潮下帶而另外一種生活在潮間帶。本研究將會闡述海洋酸化和低鹽度的協同作用，以及關鍵物種生活史的重要階段的生長和發育過程。計畫的研究成果為現行的預測框架提供充分的改進，這對於現有的海洋生態環境面臨氣候變化時的管理和保護是至關重要的。

Research Output

Nil

Nov 2012 – Oct 2014 (Ongoing)

RISK ASSESSMENT OF PHARMACEUTICAL RESIDUES AND OCCURRENCE OF ANTIBIOTIC-RESISTANT BACTERIAL GENES AND STRAINS IN HONG KONG SURFACE WATERS AND SEDIMENTS

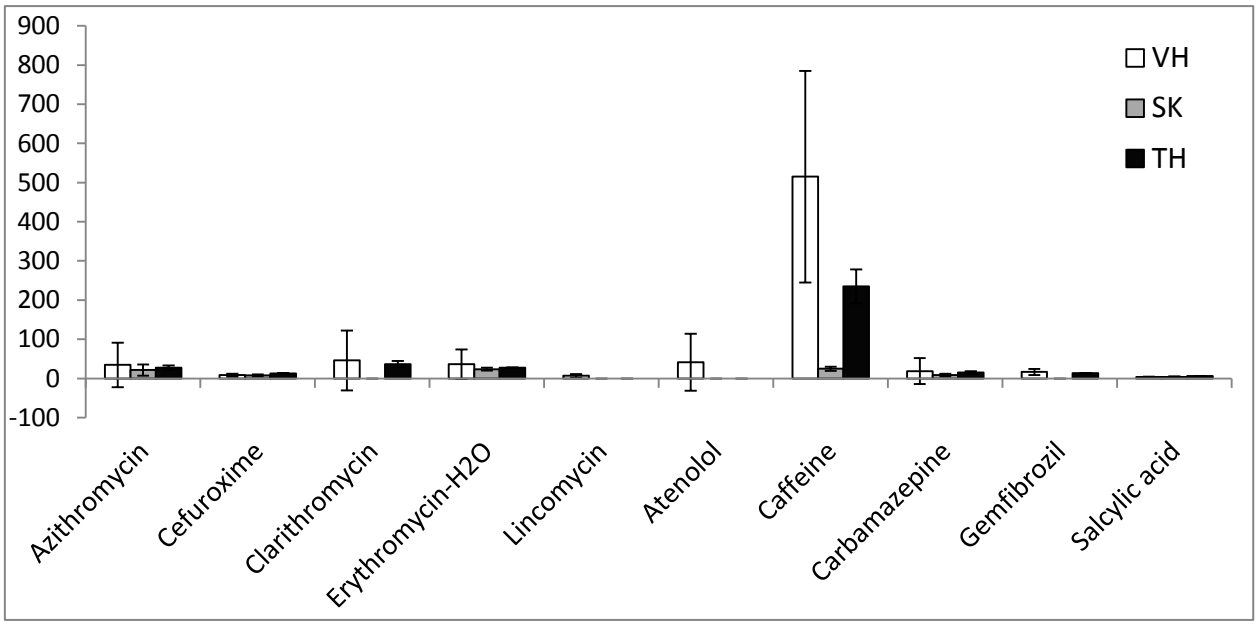
在香港的地表水和沉積物中之藥物殘留風險評估及抗生素耐藥性細菌的基因和菌株的發生

Margaret B. MURPHY, Maureen V. BOOST

The occurrence of pharmaceuticals in the natural environment due to extensive human use and release has been documented worldwide in recent years. The widespread occurrence of these biologically active compounds in both abiotic and biotic samples has raised concern about their potential toxic effects with regard to both ecological and human health. In particular, the ubiquitous environmental occurrence of human and veterinary antibiotics, coupled with clinical data showing a global rise in drug-resistant bacterial strains, has prompted research into the presence of antibiotic-resistance genes (ARGs) and resistant bacteria in natural systems. Our previous work has shown that antibiotic loadings from sewage treatment plants into the Hong Kong environment are among the highest in the world for some antibiotics; likewise, clinical studies have shown that the rate of antibiotic resistance among some bacterial strains is very high in Hong Kong. This study will therefore investigate the presence of antibiotic resistance in the Hong Kong environment in order to determine the potential impacts of pharmaceutical release. Year-long sampling of surface seawater and marine sediment will be carried out to examine seasonal variation in environmental pharmaceutical concentrations. Seawater samples will be extracted and analyzed based on our previously published method with modifications, while a new method will be developed for pharmaceutical quantification in marine sediments. Seawater and sediment samples will also be analyzed for the presence of ARGs and for resistant bacterial strains using genotypic and phenotypic methods based on sample filtration, bacterial culture on MacConkey agar and sensitivity tests for Gram-native, Gram-positive and anaerobic strains, as well as polymerase chain reaction for the amplification of ARGs. Concentrations in seawater and marine sediments will be compared with the occurrence data for the ARGs and resistant bacterial strains to determine correlations between antibiotic levels and the presence of resistance in the environment. The results of these analyses will be used to carry out a risk assessment of pharmaceuticals in the Hong Kong environment using a probabilistic approach and the use of species sensitivity distributions. This approach can then be applied to future research in China and in the Asia-Pacific region.

近年，由於人類的廣泛使用及排放，世界各地也有在自然環境中檢測到藥物發生的記錄。由於這些藥物對於生態和人類健康有潛在毒性作用，這些生物活性化合物在生物和非生物樣本中的普遍發生引起了人類對它們的關注。特別地，這些普遍在環境發生的人用和獸用抗生素，加上臨床數據顯示抗藥性

的細菌菌株在全球性上升，已促使研究抗生素抗藥性基因和抗藥性細菌在自然系統中的存在。我們過往的研究發現，某些抗生素從香港的污水處理廠排放到環境的濃度都位居世界首位。同樣地，臨床研究顯示，在香港發現的某些菌株的抗藥比率是非常高的。因此，本研究將調查抗生素耐藥性在香港的環境的存在，從而判斷藥物釋放的潛在影響。為查看季節性對環境中藥物濃度的變化，本研究將進行長達一年的表層海水和海洋沉積物的採樣。海水樣品的提取及分析方法將基於我們先前公佈的方法進行修改，而一個新開發的方法將用於海洋沉積物中的藥物量化。基於樣本過濾用於基因型和表型的方法，海水和沉積物樣品也將進行抗生素抗藥性基因和抗藥性細菌菌株存在的分析，在麥康凱瓊脂細菌培養和革蘭原生的靈敏度測試，革蘭氏陽性菌和厭氧菌株，以及使用聚合酶鍊式反應來放大抗生素抗藥性基因。在海水和海洋沉積物中的濃度將與抗生素抗藥性基因和抗藥性細菌菌株的發生數據進行比較，以判斷在環境中抗生素的水準和抗藥性的相關性。這些分析的結果將被用來進行香港環境藥物的風險評估，包括使用概率的方法以及物種敏感度分佈。然而，這種方法亦可以應用在未來中國和亞太地區的研究。



Pharmaceutical concentrations (ng/L; mean±SD) measured in Victoria Harbor (VH), Sai Kung (SK) and Tolo Harbor (TH) seawater samples in June 2013. The five compounds on the left side of the figure are antibiotics; the remaining five compounds are other pharmaceuticals. These ten compounds were most commonly detected in the sweater samples.

Research Output

Nil

Jan 2013 – Dec 2014 (Ongoing)

PHYTOREMEDIATION OF POLYBROMINATED BIPHENYL ETHERS (PBDES) BY MANGROVE WETLANDS

利用紅樹林濕地植物修復多溴聯苯醚的研究

Nora Fung Yee TAM, Han Tao ZHOU

Polybrominated biphenylethers (PBDEs), the widely used flame-retardant additives, are ubiquitous, persistent and toxic contaminants. Due to their hydrophobicity, PBDEs released to environments are accumulated in sediments, particularly in estuaries, the special coastal zones strongly influenced by anthropogenic activities. Extremely high concentrations of PBDEs have been recorded in estuarine sediments in South China. Although penta- and octa-BDEs have been banned since 2000s due to their toxicities, deca-BDEs are still produced and applied around the world. The persistence, toxicity and carcinogenic properties of PBDEs have led to increasing attention on their remediation. Over the last few decades, phytoremediation has been suggested as an innovative, non-intrusive and inexpensive technology that utilizes plant systems to remove toxic contaminants from the environment. Previous work on phytoremediation has focused on the cleanup of metal contaminated upland soil using terrestrial plants, concentrating on phytoextraction (uptake and accumulation of pollutants within plant tissues). Little is known about the phytoremediation of toxic organic pollutants by wetland plants in coastal environments. Our recent research demonstrates that mangrove plants had some tolerance to polycyclic aromatic hydrocarbons (PAHs) and the wetland system was capable of removing and degrading PAHs in contaminated sediments. However, the performance of mangrove wetlands in the cleanup of PBDE-contaminated sediments and their tolerance to PBDE stresses has never been reported. Without a clear understanding of how mangrove plants tolerate PBDE toxicity, their ability to remove and degrade PBDEs, it is difficult to promote and apply phytoremediation, an emerging technology. The proposed study therefore aims to explore the feasibility of using mangrove wetland systems to cleanup sediments contaminated with PBDEs and understand the fate of PBDEs in contaminated sediments. The study also compares the performance of different mangrove plant species, aiming to identify the most tolerant and effective species for phytoremediation purposes. The results from the proposed work will not only fill the knowledge gap on the fate of PBDEs in estuarine sediments, it will also provide very useful scientific information for developing phytoremediation strategies to clean-up contaminated sediments.

多溴聯苯醚（Polybrominated Biphenyl Ethers, PBDEs）是一類被廣泛應用於阻燃材料的添加劑，具有分佈廣，穩定性高和毒性強的特點。由於其具有疏水性質，導致 PBDEs 在釋放到環境後大量積聚在沉積物中，特別是在受人類活動影響較大的河口海岸帶地區。中國南方地區已經成為 PBDEs 的高度污染區域。儘管高毒性的五溴和八溴聯苯醚已於 2000 年被明令禁止使用，但十溴聯苯醚在全世界範圍內仍在不斷地生產和應用。可持續性、高毒性和致癌性的 PBDEs 已經引起人們不斷關注，並開始對其治理工作進行相關研究。在過去的數十年中，植物修復被認為是一個具有創新性、非入侵性和廉價的技術，利用植物系統將有毒污染物從環境中去除。已有的研究工作主要集中在利用陸生植物將重金屬從污染環境中提取，包括利用植物組織吸附和積聚污染物。然而，利用濕地植物修復沿海環境中有機污染物的研究則鮮有報導。我們近年來的研究顯示紅樹植物對多環芳烴（Polycyclic Aromatic Hydrocarbons, PAHs）具有一定的耐受性，同時紅樹林濕地系統具有一定能力清除和降解沉積物中的 PAHs。但是，紅樹林濕地對 PBDEs 污染的沉積物的淨化能力，及紅樹植物對 PBDEs 脅迫下的耐受性都是還未涉及的研究領域。為了促進並把紅樹植物修復技術發展為新興的清除 PBDEs 污染的技術，紅樹植物對 PBDEs 毒性的耐受性，及其對 PBDEs 的去除和降解能力等方面的研究需要深入開展。本研究

目的是探討利用紅樹林濕地系統清除沉積物中 PBDEs 的可行性，並進一步瞭解 PBDEs 在沉積物中的轉化途徑。同時，比較不同紅樹植物在污染條件下的特異性，進一步篩選和確定高耐受性和高有效性的植物種類，並應用於植物修復工程。本研究專案的預期結果，不僅可以填補 PBDEs 在河口沉積物轉化途徑的研究空白，而且為進一步完善植物修復技術在去除沉積物中污染物的應用提供科學理論依據。

Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

Nil

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊：

1. Zhu, H.W., Wang, Y., Wang, X.W., Luan, T.G., Tam, N.F.Y. (2014)
   Distribution and accumulation of polybrominated diphenyl ethers (PBDEs) In Hong Kong mangrove sediments. *Science of Total Environment,* 468-469:130-139.
2. Wang, Y., Zhu, H.W., Tam, N.F.Y. (2014)
   Polyphenols, tannins and antioxidant activities of eight true mangrove plant species in South China. *Plant and Soil,* (in press)

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊：

Nil

Papers with the SKLMP partial support SKLMP 部份參與的期刊論文：

Nil

Nov 2012 – Oct 2014 (Ongoing)

STUDIES ON MULTIPLE STRESSOR EFFECT OF IONIZING RADIATION AND HEAVY METALS ON MARINE FISH USING MARINE MEDAKA (*Oryzias melastigma*): TOWARDS A REALISTIC RISK ASSESSMENT

利用海洋青鱂（*Oryzias melastigma*）研究電離輻射和重金屬在海洋魚類中的多重應激源效應：邁向實際的風險評估

Peter Kwan Ngok YU

Under realistic situations, living organisms are exposed to a mixture of environmental stressors, and the resultant effects due to such exposures are referred to as “multiple stressor effects”. The resultant effects are not necessarily simple sums of the effects caused by individual stressors, i.e., showing additive characteristics. Instead, they can also show synergistic or antagonistic characteristics. However, due to a lack of information on multiple stressor effects, most biological risks on organisms (including marine organisms) can only be speculated by assuming additive characteristics among different environmental stressors.

Hong Kong will be in a region with the highest density of nuclear reactors in China in about 10 years, as 15 to 20 new nuclear reactors in Guangdong province alone will become operational. The routine or accidental fallout from these nuclear reactors will expose living organisms to ionizing radiations. Nuclear accidents at Chernobyl in Ukraine, Three Mile Island in USA, and most recently at Fukushima in Japan remind us that safety issue of nuclear power, including the associated contingency planning and risk assessment, is still a major concern. Nevertheless, the multiple stressor effects of heavy metals and ionizing radiation have not been extensively studied.

The present proposal aims to investigate the multiple stressor effect of ionizing radiation and heavy metals on marine fish using marine medaka (*Oryzias melastigma*) as a model. Apoptotic signals induced in the marine medaka will be used as the biological end point, which will be revealed through Acridine Orange staining or TUNEL assays. Realistic doses of ionizing radiation and heavy metals will first be separately applied to the fish model to obtain dose-response relationships for each individual stressor. The multiple stressor effect can then be identified by exposing the fish model to combinations of stressors, and by comparing the dose-response relationships for combined exposures to those for individual stressors. The results will significantly contribute to the goal of realistic risk assessment for combined exposure of marine fish to ionizing radiation and heavy metals.

在現實環境裡，生物體會受到多種應激源的影響，產生的效果被稱為“多重應激源效應”。多重應激源效應未必是個別應激源影響的簡單總和，這些個別應激源的影響也可以顯示協同或拮抗特性。然而，由於缺乏多重應激源效應的資料，大多數生物體（包括海洋生物）的風險評估只能在多重應激源效應就是個別應激源影響的總和的簡單假設下提出。

在大約十年後，香港將處於全中國核反應堆密度最高的區域內，單是廣東省便將有 15 至 20 座新的核反應堆投入使用。這些核反應堆的正常或意外排放都會引致生物體受到額外的電離輻射劑量。烏克蘭切爾諾貝利，美國三哩島，和最近日本福島的核事故都時刻在提醒我們核電的安全依然是值得我們關注的問題，包括相關的應急計劃和風險評估。然而，重金屬和電離輻射的多重應激源效應還沒有被廣泛研究。

本課題旨在探討利用海洋青鱗（*Oryzias melastigma*），通過吖啶橙染色或 TUNEL 測定揭示的 細胞凋亡信號以研究電離輻射和重金屬在海魚中的多重應激源效應。透過實際的電離輻射和重金屬劑量，個別應激源的劑量反應關係會先被確立，再通過對比不同應激源組合的劑量反應關係，以揭示電離輻射和重金屬的多重應激源效應。得出的結果將有助於評估海魚同時暴露於電離輻射和重金屬時的實際風險。

Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

1. Yu, K.N., Tung, M.M.T., Choi, V.W.Y., Cheng, S.H. (2012)
   Alpha radiation exposure decreases apoptotic cells in zebrafish embryos subsequently exposed to the chemical stressor, Cd. *Environmental Science and Pollution Researc*h, 19:3831-3839.

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊論文：

1. Choi, V.W.Y., Cheung, A.L.Y., Cheng, S.H., Yu, K.N. (2012)
   Hormetic effect induced by alpha-particle-induced stress communicated in vivo between zebrafish embryos.
   Environmental Science and Technology, 46:11678-11683.
2. Choi, V.W.Y., Ng, C.Y.P., Kobayashi, A., Konishi, T., Suya, N., Ishikawa, T., Cheng, S.H., Yu, K.N. (2013)
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   Environmental Science and Technology, 47:6368-6376.
3. Choi, V.W.Y., Ng, C.Y.P., Kong, M.K.Y., Cheng, S.H., Yu, K.N. (2013)
   Adaptive response to ionizing radiation induced by cadmium in zebrafish embryos.
   Journal of Radiological Protection, 33:101-112.
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5. Choi, V.W.Y., Konishi, T., Oikawa, M., Cheng, S.H., Yu, K.N. (2013)
   Threshold number of protons for inducing adaptive response in zebrafish embryos.
   Journal of Radiological Protection, 33:91-100.

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊：

Nil

Papers with the SKLMP partial support SKLMP 部份參與的期刊論文：

Nil

Summary of the Internal Research Seed Fund (IRSF) Projects

IRSF 項目概要

Dec 2011 – Dec 2013 (Completed)

DEVELOPMENT OF NOVEL TECHNOLOGY FOR EARLY DIAGNOSIS AND MONITORING OF IMMUNOTOXIC POLLUTANTS IN MARINE ENVIRONMENT

建立新技術和方法用於早期監控和診斷海洋環境中的免疫毒性污染物

Doris Wai Ting AU

Increasing evidence has shown that many man-made pollutants can markedly suppress the immune system of marine fish. Impairment of immune competence will inevitably decrease fish's resistance to ubiquitous pathogens in water, which may lead to significant impact on the sustainability of fish population. Thus far, there is a lack of sensitive and cost-effective tools available for early detection of immune impairment in marine fish, which is urgently need for monitoring of immunotoxicants in the marine environment. In this study, we aim to develop a suite of immune function assays at different biological levels, using the *Oryzias melastigma* as a marine fish model, to address this problem.

A suppression subtractive hybridization (SSH) cDNA library was constructed for the marine medaka to identify differentially expressed immune genes in the liver of marine medaka upon infection with pathogenic *Vibrio parahaemolyticus*. Among the 396 genes identified, 38 (9.6%) were immune-related genes, in which 17 genes were involved in the complement system. The cDNA library of mixed organs were also constructed, 33 immune genes were identified. In both libraries, the complement system genes were found to be the major components of immune genes. The immune genes library obtained in this study will be useful for future study on elucidation of immunosuppressive mechanisms of immunotoxic chemicals in marine medaka.

A battery of cellular and histological assays have been developed to assess change in immune function and competence in marine medaka at different life stages, including i) the embryo/larvae chips and the whole adult medaka histoarray for analyzing significant histopathological change of immune organs/cells upon exposure to immunotoxic chemicals; ii) the respiratory burst assay for detection of reactive oxygen species (ROS) production to assess the immune response of larvae, and iii) the flow-cytometry analysis to detect change of type and number of immune cells in blood. Finally, to evaluate the immune competence of whole fish, a variety of pathogenic bacteria and virus were screened to establish reliable and reproducible host resistance assays for both larvae and adults. The successful development of a battery of immune function assays using marine medaka will constitute a comprehensive understanding on the immunosuppressive effects of environmental contaminants on marine fish. An on-going experiment using 17alpha-ethinylestradiol (EE2) as a representative estrogenic endocrine disruptive compound has been conducted to validate the above findings.

如今，許多人造污染物能對海洋魚類的免疫系統功能產生影響已經形成共識。免疫系統的損害不可避免地會導致魚類對水體環境廣泛存在的病原體抵禦能力的下降，繼而影響魚類種群的繁殖。然而，如今用於早期監控和診斷海洋免疫毒性污染物的敏感、有效和經濟的手段還沒有建立起來。這些方法對於海洋環境污染物的監測至關重要。在這個研究中，我們著力于利用海洋青鱗作為海洋魚類模式生物，建立一套在不同生物水準測定免疫功能的方法來解決這個問題。

我們用致病菌 *Vibrio parahaemolyticus* 感染後的海洋青鱔肝臟建立了抑制消減雜交文庫，從而獲得了差異表達的基因。在所有被鑒定的 396 條基因中，有 38 條（9.6%）是免疫相關基因，而其中 17 條基因參與補體系統。同時我們用混合器官建立了 cDNA 文庫，其中 33 條基因被鑒定為免疫相關基因。我們在兩個文庫中都發現補體系統基因是免疫基因的重要組成部分。從這次實驗獲得的免疫基因資訊將對未來研究免疫毒性污染物對海洋青鱔的免疫系統抑制機理有重要作用。

我們還建立了一系列細胞和組織學水準上的實驗方法用於評價海洋青鱔不同發育時期的免疫功能變化。這些方法包括 1）“胚胎組織學陣列”和“幼魚組織學陣列”，以及成魚整魚組織學方法用以檢測在暴露免疫毒性化合物後免疫器官和細胞重要的病理組織學變化； 2）用於檢測幼魚在呼吸爆發時產生的活性氧簇（Reactive Oxygen Species, ROS）測定方法，從而評價幼魚的免疫反應；3）流式細胞分析方法，用於檢測血液中免疫細胞種類和數量的變化。最後，為了評價幼魚和成魚整體免疫功能，我們篩選了包括細菌和病毒在內的多種病原物，建立了高重複性可靠的宿主抵禦測定方法。這些不同免疫測定方法的成功建立形成了一個用以研究人造污染物對魚類免疫抑制作用的綜合性平臺。我們已經在用人造雌激素 17alpha-ethinylestradiol（EE2）作為模式雌激素性內分泌干擾物驗證此平臺的有效性。

Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

1. Ye, R.R, Lei, N.Y., Lam, M.H.W., Chan, A.K.Y., Bo, J., van de Merwe, J.P., Fong, A.C.C., Yang, M.M.S., Lee, J.S., Segner, H.E., Wong, C.K.C., Wu, R.S.S., Au, D.W.T. (2012)
   Gender specific modulation of immune system complement genes expression in marine medaka *Oryzias melastigmas* following dietary exposure of BDE-47.
   Environmental Science and Pollution Research, 19:2477-2487.

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊：

1. Bo, J., Giesy, J.P., Ye, R.R., Wang, K.J., Lee, J.S., Au, D.W.T. (2012)
   Identification of differentially expressed genes and quantitative expression of complement genes in the liver of marine medaka *Oryzias melastigma* challenged with *Vibrio parahaemolyticus*.
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2. Cheung, N.K.M., Hinton, D.E., Au, D.W.T. (2011)
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3. Bo, J., Cai, L., Xu, J.H., Wang, K.J., Au, D.W.T. (2011)
   The marine medaka *Oryzias melastigma* – A potential marine fish model for innate immune study.
   Marine Pollution Bulletin, 63:267-276.
4. Cheung, N.K.M., Cheung, A.C.K., Ye, R.R., Ge, W., Giesy, J.P., Au, D.W.T. (2013)
   Expression Profile of Oestrogen Receptors and Oestrogen-related Receptors is Organ Specific and Sex Dependent: the Japanese Medaka Oryzias latipes Model.
   Journal of Fish Biology, 83(2):295-310.

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊：

Nil

Papers with the SKLMP partial support SKLMP 部份參與的期刊論文：

Nil

Jan 2012 – Dec 2013 (Completed)

QUANTIFICATION OF POLY- AND PERFLUORINATED COMPOUNDS (PFCS) AND SPECIES IDENTIFICATION OF SHARK FINS PURCHASED FROM HONG KONG SEAFOOD SHOPS

在香港海味乾貨店購買的魚翅的聚和全氟化合物(全氟碳化物)之定量和鯊魚種屬鑑定

Margaret B. MURPHY

Shark populations are declining around the world, largely due to overfishing and the global shark fin trade. In contrast to many other marine predators, there is a lack of information on the contaminant status of sharks, particularly with regard to poly- and perfluorinated compounds (PFCs), which are used as surface protectors and surfactants both industrially and in manufactured products. Some PFCs have been shown to be persistent and toxic, and thus these chemicals are of global concern. Unlike many organic contaminants, PFCs tend to partition to protein-rich tissues. As such, they can be detected in bird feathers, which are composed primarily of keratin; in this project, a method will be developed based on the method for feathers to measure PFCs in shark fins, which are composed of the structural protein collagen, using acid digestion, solid-phase extraction and high performance liquid-chromatography tandem mass spectrometry (HPLC-MS-MS). Shark fins are readily available in Hong Kong, which is the largest market in the global fin trade; shark fin soup is also commonly consumed locally. In this project, shark fins will be purchased from seafood shops around the city in collaboration with the marine conservation group BLOOM and analyzed for concentrations of short- and long-chain PFCs, and a hazard assessment will be carried out to determine the hazard of shark fin consumption to humans due to PFCs. Individual fins will also be identified at the species level using DNA extraction and sequencing in order to get more information on the species involved in the global shark fin trade, and to relate PFC exposure and accumulation to trophic level and species. By combining ecotoxicology and conservation biology, this project will provide data with relevance to both environmental and human health.

世界各地的鯊魚數量正在下降，主要是由於過度捕撈和全球魚翅貿易。全氟碳化物是在工業上和製成品中用來作為表面保護和表面活性劑的物質。有別於其他海洋食肉動物，現時這些化合物對鯊魚的污染仍然是缺乏的。由於一些全氟碳化物已被證實是持久而有毒的，因此它們亦引起全球關注。有別於一般的有機污染物，全氟碳化物傾向分配在富含蛋白質的組織中。因此，它們可以在主要由角蛋白組成的鳥的羽毛中被檢測出來。在這個項目中，一個建基於用羽毛來量度魚翅中的膠原蛋白內含有的全氟碳化物的方法將會被開發，當中包括利用酸消化，固相萃取和高效液相色譜串聯質譜法。在香港，魚翅是一應俱全而魚翅湯也是常食到的，這裡亦是全球魚翅貿易最大的市場。在這個項目中，通過與海洋保育團體 BLOOM 合作，不同的魚翅將在香港海味乾貨店中購買，以分析短鏈和長鏈全氟碳化物濃度，並進行風險評估，從而判斷人類食用含全氟碳化物魚翅後的風險。每個魚翅樣品均會在物種水平上使用脫氧核糖核酸提取和測序，以獲得參與全球魚翅貿易的物種的詳細信息，以及找出全氟碳化物的暴露和積累與營養級和物種的關係。通過結合生態毒物學和保護生物學，該項目將提供與環境和人類健康相關的數據。

Research Output

Nil

Summary of the Seed Collaborative Research Fund (SCRF) Projects

SCRF 項目概要

Nov 2011 – Oct 2014 (Ongoing)

INTERACTIVE EFFECTS OF CLIMATE CHANGE AND HYPOXIA ON FISH SEX DETERMINATION: ESTROGEN SYNTHESIS AND MASCULINISATION

Richard Y.C. KONG, Rudolf S.S. WU, Richard M.K. YU

Episodes of aquatic hypoxia (< 2 mg O2 L-1), along with elevated water temperatures are likely to be exacerbated as climate change progresses. Recent studies by our group have demonstrated for the first time that hypoxia disrupts fish sex differentiation, leading to a male-biased sex ratio in the zebrafish and Japanese medaka. Coincidentally, in many fish species exposure to elevated water temperature also leads to male-biased sex ratios. Under climate change, increased frequency of hypoxic episodes and warmer waters are likely to intensify such sex change events. Such shifts in the operational sex ratio are likely to have dire consequences for reproduction and recruitment of fish assemblages inhabiting small lentic waterbodies, potentially leading to losses in biodiversity and fisheries productivity. Despite this emerging threat, the question of how hypoxia and elevated temperature interactively alter fish sex differentiation and hence sex ratios remains unexplored.

One of the mechanisms known to disrupt sex differentiation is interference with sex hormone synthesis. Recent findings in our lab suggest that the inhibition of estrogen synthesis might be a crucial cause of hypoxia-induced masculinisation (the development of male sexual characteristics in a genotypic female). Curiously, inhibition of estrogen synthesis has also been widely observed in masculinised fish as a result of heat treatment, indicating both hypoxia and elevated temperature may share common mechanisms of action on sex differentiation.

Ovarian aromatase (cyp19a) is the steroidogenic enzyme that converts androgens to estrogens. Decreases in cyp19a gene expression can be a major cause of reduced estrogen synthesis under hypoxic and heat conditions, however, the mechanism underlying this gene suppression remains elusive. The transcription factor hypoxia inducible factor-1 (HIF-1) is the master regulator of a broad range of genes responsible for oxygen homeostasis. Intriguingly, HIF-1-mediated gene expression is upregulated not only by hypoxia but also high temperature, implying its critical role in adaptive responses to both stresses (including repression of energy-consuming reproductive processes). As suggested by a recent study using mammalian cancer cells, a possible mechanism of how HIF-1 suppresses cyp19a gene expression could be via depletion of the estrogen receptor (ER), a key transcriptional activator of cyp19a, although this possibility has not been tested in vivo or in fish thus far. Through understanding the responses and effects of hypoxia-and heat-induced HIF-1 on cyp19a gene expression and estrogen synthesis, this study will establish a novel molecular link between climate change and altered sex ratio in fish populations.

氣候變化及缺氧對魚類性別決定（雌激素合成及雄性化）的相互影響

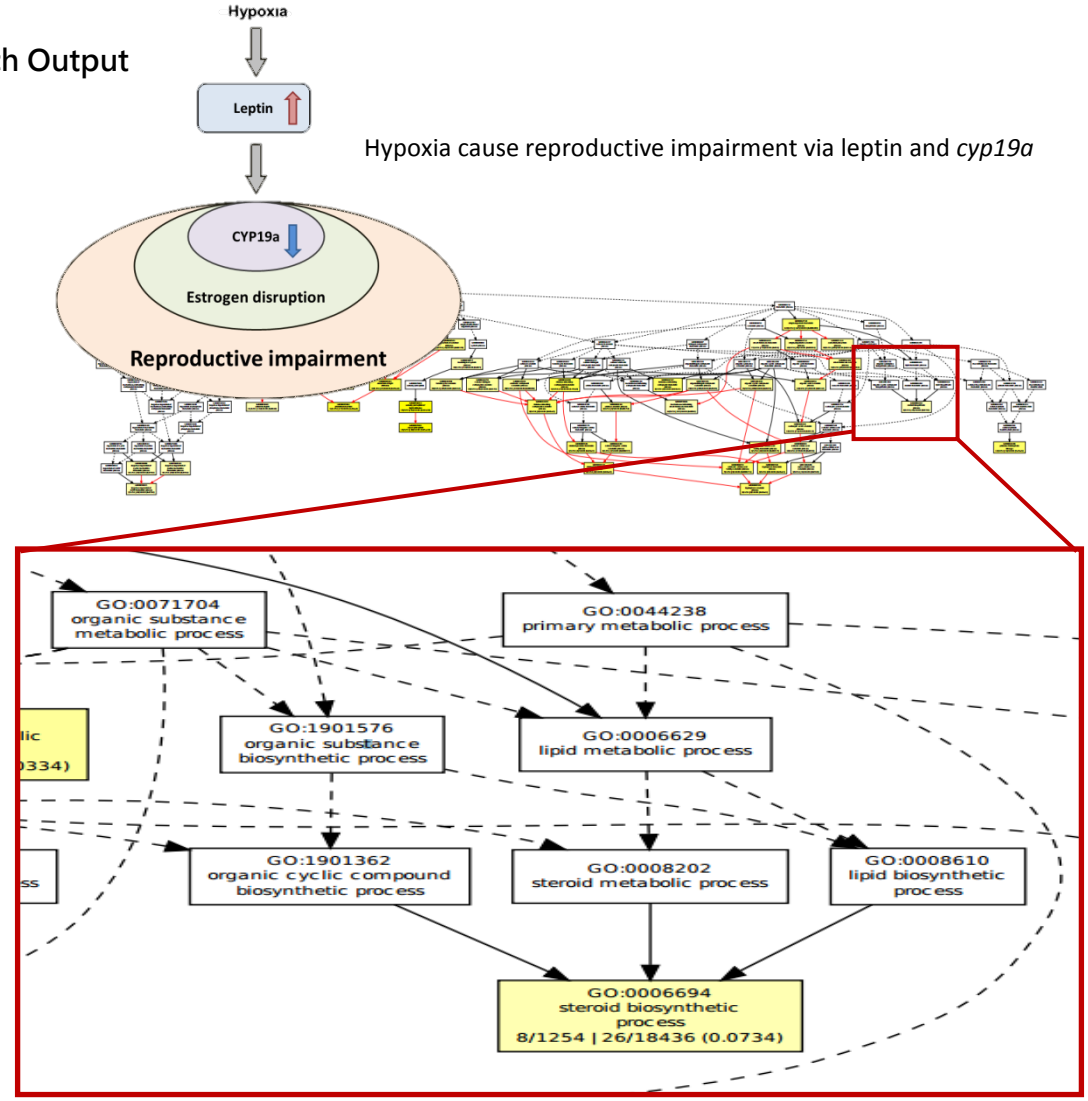
水體缺氧（溶解氧濃度低於每升 2 毫克）及水温上升的情況很可能因氣候變化行進而加劇。本小組最近的研究已經首次證明，在斑馬魚和日本青鱂魚中，缺氧狀況會破壞魚類的性別分化,導致雄性偏向性比。巧合地，許多魚類品種在暴露於高溫水後，也會出現雄性偏向的性別比率。在氣候變化之下，水域缺氧 狀況次數的增多和水溫提升可能加劇性別改變事件。這種性別比例變化很可能對魚類繁殖和聚居於小型靜水生態系統中的魚類群落造成可怕的後果，可能損 害生物多樣性和漁業生產力。儘管這些問題日趨嚴重，但缺氧和高溫如何交互改變魚類性別分化及性別比例這個問題仍未可知。

干擾性激素合成是一個眾所周知會破壞性別分化的機制。本實驗室最近的研究結果表明，抑制雌激素合成可能是導致缺氧引起的雄性化（基因型雌性發育出 男性性徵）的一個重要原因。同時，雄性化魚類受熱後出現雌激素合成抑制的情況也普遍存在，說明了缺氧和高溫可能在影響性別分化上共用相同的作用機制。

卵巢芳香化酶（cyp19a）是轉化雄激素為雌激素的類固醇合成酶。cyp19a 基因表達水平下降可能是導致在缺氧和受熱情況下雌激素合成降低的 一個重要原因。可是，有關該基因受抑制的機制仍不清楚。轉錄因子低氧誘導因子-1（HIF-1）是大量維持氧穩定基因的的主調節器。有趣的 是，HIF-1α 介導的基因表達水平上升不僅受缺氧狀況，同時亦因高溫影響，這意味著它對適應這兩種環境壓力 有關鍵作用（包括抑制耗能的生殖過程）。最近一項使用哺乳動物癌細胞的研究中提出，HIF-1 抑制 cyp19a 基因表達的可能機制是由於雌激素受體（ER）cyp19a 的一個關鍵轉錄激活因子）的消耗。可是，這個可能性從未在活體或魚類上作測試。通過了解 cyp19a 基因表達和雌激素合成如何受缺氧和受熱誘導的 HIF- 1 影響，本研究將對氣候變化和魚類種群間性別比改變建立一個新的分子橋樑。

Research Output

Nil



Hypoxia cause reproductive impairment via leptin and *cyp19a*

Gene Ontology hierarcical tree showing interactive relationship of down- regulated biological process under hypoxia.

SCRF

Nov 2011 – Oct 2014 (Ongoing)

ESTABLISHING THE GREEN LIPPED MUSSEL PERNA VIRIDIS AS A UNIVERSAL MARINE MODEL ORGANISM AND POLLUTION BIOMONITOR FOR ECOTOXICOLOGY AND ENVIRONMENTAL GENOMICS

翡翠貽貝（*Perna viridis*）作為海洋生態毒理學和環境基因組學的通用模式生物以及相關污染物生物指示種的研究

Kenneth M.Y. LEUNG, Paul K.S. LAM, Leo L. CHAN, Chris K.C. WONG, J.W. QIU

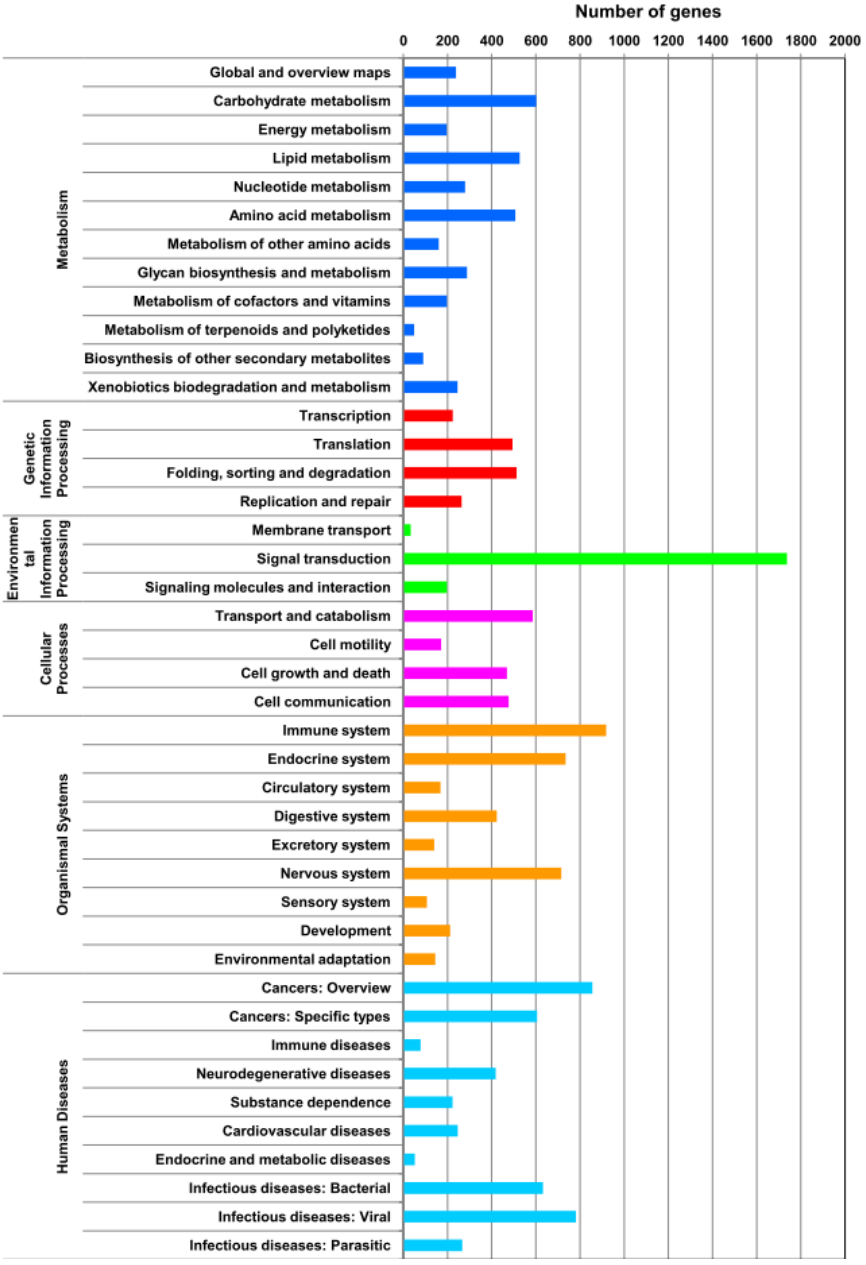
The green-lipped mussel *Perna viridis* is widely used as a sentinel species in marine pollution monitoring and ecotoxicological studies in Asia-Pacific region. This species is considered as a tropical/subtropical equivalent biomonitor of the temperate *Mytilus* species. In order to elucidate pollutant effects on this common biomonitor species and provide early warning signals of pollutant-mediated stresses, it is prerequisite and essential to understand the toxic mechanisms at molecular level and identify a suite of reliable exposure- and effect-related biomarkers for diagnostic purpose. Global analyses of the expression levels of genes and their products (i.e., RNA and proteins) are increasingly employed in marine model organisms (e.g., copepods, medaka fish, and mussels *Mytilus* species) to achieve such goals. Despite the important role of *P. viridis* in environmental and toxicological studies, its genomic resources are currently extremely limited when compared with their temperate counterparts, *Mytilus* species. Such an obstacle has significantly hindered the further development of *P. viridis* as a universal model species for ecotoxicological, genomic and proteomic studies. Therefore, this study aims to first establish a comprehensive and representative putative transcriptome database for *P. viridis* using the next generation sequencing technology. With the help of bioinformatics, the outcomes of this study will significantly improve our genomic knowledge of *P. viridis*. The analysis will cover three main organs, i.e., hepatopancreas, adductor muscle and gill, which are commonly used in biomonitoring. The established tissue-specific transcript databases will provide a novel and important "back-bone" resource for genome-wide association studies of *P. viridis* which will enable us to uncover the toxic mechanisms, establish concentration-dependent biomarker responses, and develop advanced pollution monitoring tools. Secondly this study aims to address the molecular toxic mechanisms of selected trace metals (e.g. cadmium and copper), persistent organic pollutants (e.g. triphenyltin and PBDE) and nano-particles (e.g. nano metal oxides and carbon nanotubes) in *P. viridis* upon waterborne and/or dietary exposure. The results of this study will also help us to underpin the toxic response pathways for various groups of pollutants, from which we will identify a suite of reliable biomarkers for further development of gene-based biosensors and ELISA-based protein-arrays. These advanced diagnostic tools can be used to provide rapid effect-based biomonitoring of marine pollution and screening for new chemicals in the near future. Given the popularity and increasing importance of *P. viridis*, this work will make significant visible impact and contribution to the advancement of marine pollution research in the region.

翡翠貽貝（*Perna viridis*）是一種在亞太地區被廣泛應用於檢測海洋環境污染的指示生物。牠的地位與溫帶的貽貝(*Mytilus* 物種)看齊，是熱帶及亞熱帶地區內等效的生物檢測物種。為了更好的闡述污染物對該指示種的毒性響應機制以便找出早期預警信號，我們有必要對其在污染物暴露時所產生的分子毒理機制及相關物標記進行研究。近年來，基因序列及其表達產物（如核糖核酸和蛋白質）已被廣泛應用於海洋生物指示種（如橈足類，青鱗和貽貝）的相關毒理研究。雖然翡翠貽貝在環境科學和環境毒理學領域中處於非常重要的地位，但是牠與溫帶的貽貝(*Mytilus* 物種)相比，牠的基因信息資源卻相當匱乏，這也大大阻礙了其作為生態毒理學、基因組學和蛋白質組學模式生物的建立。因此，本研究首先利用 "下一代" 基因測序技術（next generation sequencing）建立一個翡翠貽貝的轉錄組數據庫。

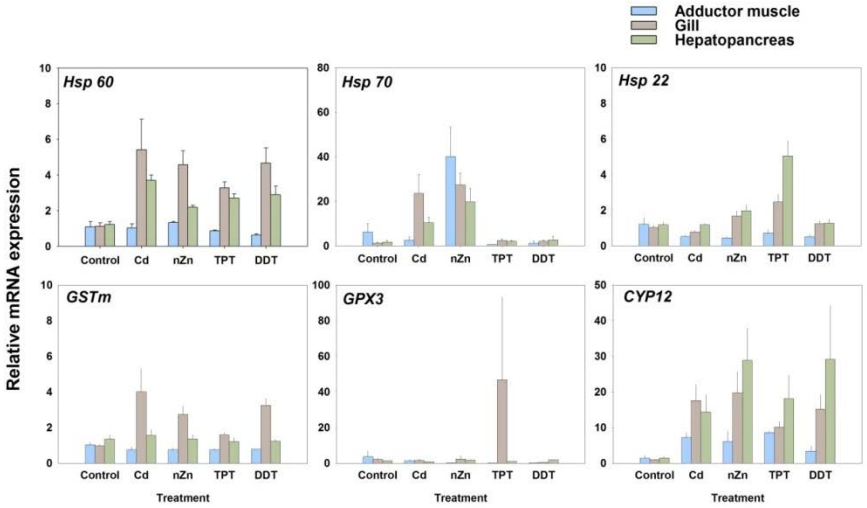
SCRF

通過借助於生物信息學手段，測序所得結果將會顯著地增加我們對翡翠貽貝的基因組序列的了解。本研究中採用三種常被用來作為生物監測的器官（即肝胰臟、內收肌和腮）進行轉基因組序列分析。這些器官特異的轉錄組數據將會為我們進一步研究翡翠貽貝基因相關的毒性響應機制提供重要的資源基礎；例如，毒理機制的分析，濃度相關的生物標記的建立以及更高級別的污染檢測工具的開發等。

其次，本研究項目亦致力於翡翠貽貝對相關污染物如重金屬（如鎘和銅），持續性有機污染物（如三苯基錫和多溴二苯醚）以及納米顆粒物（如納米金屬氧化物和碳納米管）通過水性暴露或食物暴露時的分子毒理學機制進行研究和分析。研究結果會幫助我們了解分析不同污染物所產生的特異性的毒性反應途徑，進而識別出更加可靠的生物標記，以便進一步建立以基因為基礎的生物監測指標和以酶聯免疫吸附試驗為基礎的蛋白質陣列。這些診斷工具亦可應用於快速而有效的海洋污染物的生物監測以及新化學物質的篩選。鑑於翡翠貽貝在海洋領域的重要生物位置，本研究結果不單將會對海洋污染物研究和發展提供重要的參考價值，並且促進亞太地區的海洋環境檢測方面的技術和相關的科研。



Distribution of transcripts from *Perna viridis* with putative protein annotations assigned to the KEGG pathways.



Results of the quantitative PCR analysis on the relative gene expression of selected stress-associated genes (Heat shock protein, *Hsp 60, Hsp 70, Hsp 22; GSTm*, glutathione-s-transferase mu-class; *GPX3*, glutathione peroxidase 3; and *CYP12*, cytochrome p450 12) from the three target tissues after 24-h exposure to various sub-lethal treatments (i.e., control, seawater control; Cd, cadmium chloride; nZn, nano zinc oxide; TPT; triphenyltin chloride; and DDT, dichlorodiphenyltrichloroethane).

Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

Nil

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊論文:

1. Bao, V.W.W., Leung, K.M.Y., Lui, G.C.S., Lam, M.H.W. (2012)
   Acute and chronic toxicities of Irgaol alone and in combination with copper to the marine copepod *Tigriopus japonicus*. *Chemosphere*, 90(3):1140-1148.
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   ***De novo* transcriptomic profile in the gonad tissue of the intertidal whelk *Reishia clavigera*.**
   Marine Pollution Bulletin, (accepted)

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊：

Nil

Papers with the SKLMP partial support SKLMP 部份參與的期刊論文：

Nil

Jan 2012 – Dec 2014 (Ongoing)

SOURCES AND BIOACCUMULATION OF MERCURY AND CADMIUM IN THE PEARL RIVER ESTUARY (PRE) AND HONG KONG COASTAL WATERS

珠江河口和香港沿海水域汞、鎘的來源和生物富集

Xiang Dong LI, Wen Xiong WANG

Toxic metals are among the major contaminants in marine ecosystems. Metal contamination has become a major environmental problem in many parts of the world. In the Pearl River Estuary (PRE) and Hong Kong coastal water, two metals are of major concern in the marine environments, namely mercury and cadmium. It is well known that mercury (especially its organic form: methylmercury) is biomagnified at the top of marine food chains (such as in marine fish). Recent evidence has also shown that cadmium can be biomagnified in marine benthic food chains (e.g., intertidal rocky shores). The biomagnification of these two metals in

predatory marine fish and gastropods can present significant health risks to human through seafood consumption in Hong Kong and the South China co astal regions. Although metal pollution has been recognized in Hong Kong for several decades, the understanding of the biological and environmental behaviors of mercury and cadmium still remains very poor. The mechanisms on how different marine organisms handle metals and how such handling affects metal toxicity are extremely challenging research topics. Such complexity is further augmented by the very complicated but unique hydrographic conditions in the subtropical Pearl River Estuary and Hong Kong coastal waters. This proposed research project will aim to study (1) the sources and geochemical behavior of mercury and cadmium in the PRE and Hong Kong waters; (2) the biological fates and food web dynamics of mercury and cadmium in the subtropical region; and (3) the bioaccumulation of mercury and cadmium in the top predators of these food chains under different hydrographical conditions/exposure histories, and the assessment of seafood safety issues in the study area. The proposed research will increase our understanding of mercury and cadmium pollution in coastal environments, and will provide scientific advice to regulatory agencies and industries for better management of toxic metals in the marine environment.

有害重金屬是海洋生態系統中的主要污染物。 金屬污染已成為很多地方主要的環境問題，在珠江河口和香港沿海水域，汞和鎘這兩種金屬值得廣泛關注。 眾所周知，海洋食物鏈頂端（如海洋魚類）會對汞（特別是它的有機形態：甲基汞）產生生物放大作用。 最近有證據顯示，鎘在海洋底棲食物鏈也有生物放大作用（如潮間岸）。 這兩種金屬在魚類和腹足動物的生物放大作用，會通過水產品的食用而對人類產生重大健康風險。 儘管幾十年來，香港金屬污染的情況已被普遍認識，但對汞、鎘的生物化學過程和環境行為的認識仍然非常有限。 關於海洋生物如何處理不同的金屬污染物以及金屬毒性機制的研究具有非常重要的意義。 由於珠江河口和香港沿海複雜而獨特的亞熱帶水文條件，使得研究變得更具有挑戰性。本研究課題主要集中在：(1)汞和鎘在珠江河口和香港水域的來源和環境地球化學行為；(2)汞和鎘在亞熱帶河口地區的生物傳遞及環境效應; 和(3)汞和鎘在不同水文條件/暴露途徑下在食物鏈的生物累積效應，以及水產品食物安全問題的評估。本研究課題將提高對沿海環境汞、鎘污染問題的認識，並將向監管機構和有關行業提供科學的建議，以更好促進的海洋環境保護和管理。

SCRF

Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

Nil

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊論文：

Nil

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊論文：

1. Chen, B.W., Liang, X.M., Xu, W.H., Huang, X.P., Li, X.D. (2012)
   The changes in trace metal contamination over the last decade in surface sediments of the Pearl River Estuary, south China. *Science of the Total Environment*, 439:141-149.

Papers with the SKLMP partial support SKLMP 部份參與的期刊論文：

Nil

Nov 2011 – Oct 2014 (Ongoing)

ASSESSING THE IMPACTS OF ORGANIC AND METAL POLLUTION ON SYMBIOTIC MICROBIAL COMMUNITIES IN MARINE CORALS AND SPONGES BY METAGENOMICS AND TRANSCRIPTOMICS APPROACHES

利用宏基因組和宏轉錄組技術評估有機物污染和重金屬污染對海綿和珊瑚的共生微生物群落的影響

Pei Yuen QIAN

Polybrominated diphenyl ethers (PBDEs) have been widely used as flame retardants since the 1970s and become ubiquitous in the environment nowadays. In the present study, we examined whether PBDEs could alter the bacterial communities inhabiting the marine sponge and alter their response to environmental stress. Our results showed that the bacterial community structure shifted from a Proteobacteria-dominated to a Firmicutes-dominated community in response to PBDE-47 at a time- and concentration–dependent manner. Exposure to a higher level of PBDE-47 caused a decrease in the autotrophic Chromatiaceae (potentially symbiotic) but an enrichment for the *Clostridium* and other heterotrophic bacteria. A metagenomic comparison indicated that functional genes of two bacterial DNA repair systems (UvrABC and RecBCD) were significantly enriched by PBDE-47, which may be responsible for the repair of DNA adducts and strand breaks caused by PBDE-47. Genes responsible for bacterial spore formation and flagellar motility were also enriched, likely serving as a defense mechanism against the cy totoxicity of PBDE-47. Functional comparisons showed that functional genes involved in multidrug efflux pump, chemotaxis signal transduction, carbohydrate hydrolysis and ABC transporter for nutrient uptake were also significantly enriched by the treatment. Our results suggest that PBDE-47 confers a selection pressure on bacterial communities with multiple strategies to defend against the perturbation of PBDE-47.

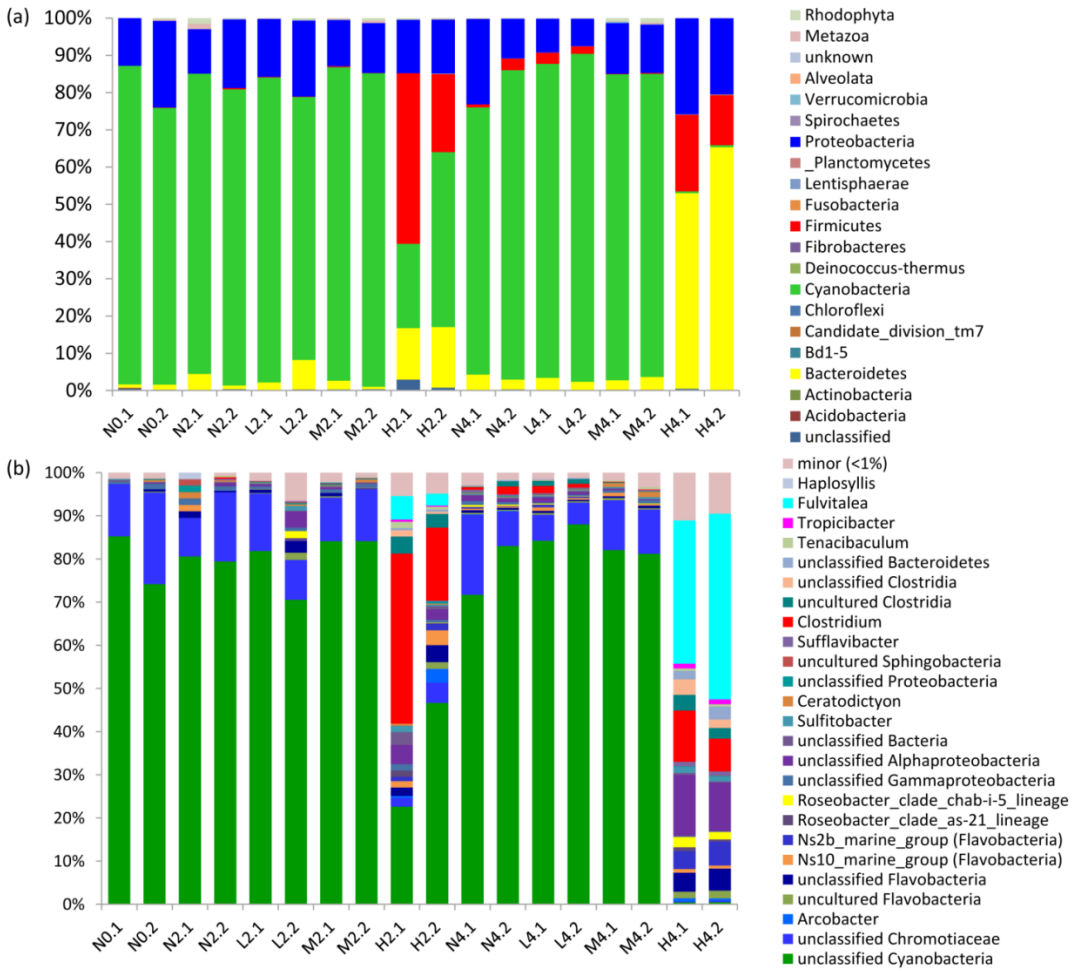
Copper has been one of the major heavy metal pollutants in the marine environment. Effect of copper on symbiotic microbial community in sponge, and the subsequent defense mechanism of microbial community are largely unknown. Our treatment experiment and analysis on the copper treated sponges and the controls showed that copper treatment has shift the bacterial community which is dominated by a sulfur oxidizing bacterium (SOB) to a heterotrophic community dominated by *Fulvitalea*, *Clostridium*, *Roseobacter* and genera from *Flavobacteria*. The functional analysis indicated that the copper treatment has significantly enriched the microbial functions of membrane transport, motility and chemotaxis, and virulence. Overall, the copper treatment transferred the symbiotic microbial community to a copper-enduring community with virulence.

Marine sponges are the most primitive metazoan and form close association with sponge-specific symbiotic microbial communities. Sulfur cycling driven by sulfur reducing bacteria (SRB) and sulfur oxidizing bacteria (SOB) plays essential role in many sponges. However, the detailed bacterial characteristics and physiology of SRB or SOB are largely unknown. Here we present the first nearly complete genome of symbiotic SOB of sponge by the method of metagenomic binning. Usage of ancient polyphosphate glucokinase, and lack of transposase suggest that the symbiotic relationship had been established between the SOB and sponge for a long time. The symbiotic life mode of the SOB was supported by the richness of ankyrin repeats in proteins which help the bacterium escape from digestion of host. The complete set of the genes involved in sulfur oxidizing is supposed to protect the host from intoxication. Remarkable lack of virulence compared to the free living counterparts probably also contributed to the symbiosis between the bacterium and the host. Interestingly, however, the bacterium is greedy. It developed versatility in uptake and metabolism of carbohydrates (saccharides utilization, aromatic compound degradation, amino acid uptake and so on) for heterotrophic life, compared to the reference SOB. The capability of both autotrophic and heterotrophic metabolism has contributed to robust competitiveness of the bacterium which has become the most dominant species in the microbial community of the sponge.

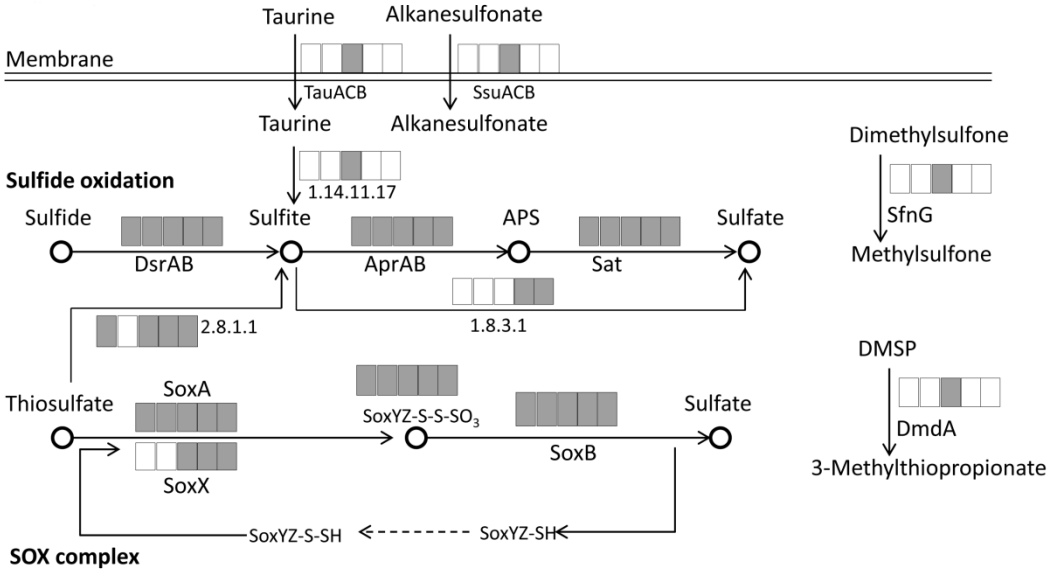
19 世紀 70 年代以來，多溴聯苯醚（PBDEs ）被廣泛的用作阻燃劑並且在環境中積累。在此項研究中，我們研究 PBDEs 對海綿中細菌群落的影響和它們（細菌群落）對環境脅迫的反應。結果表明 PBDE-47 能將變形菌門為主的細菌群落轉變成硬壁菌門為主的細菌群落，並且它的影響與處理時間和濃度相關。高濃度的 PBDE-47 處理能降低自養的著色菌科細菌（潛在共生細菌）的含量，而增加梭菌屬和其它異養的細菌的含量。宏基因組比較分析顯示 PBDE-47 處理能顯著富集 DNA 修復系統（UvrABC and RecBCD）相關的功能基因，而這些基因可能與 PBDE-47 造成的 DNA 損傷的修復相關。芽孢形成和鞭毛運動相關的基因也增加了，可能與防禦 PBDE-47 的細胞毒性相關。另外，藥物清除, 化學信號傳遞, 碳水化合物水解和養分跨膜運輸相關的基因也被顯著富集了，這些功能可能與細菌群落抵禦 PBDE-47 毒性的多重策略有關。

金屬銅已經成為海洋環境裡重金屬污染的主要成分，但是銅對海綿裡微生物群落的影響，以及它們的防禦性機制仍然未研究清楚。我們的銅處理實驗及分析表明，銅可以將自養的硫氧化細菌（也即前面所提到的著色菌科細菌）為主的細菌群落轉變為異養的 Fulvitalea, Clostridium, Roseobacter 和 Flavobacteria 為主的細菌群落。功能分析顯示，細胞膜運輸，細胞運動和化感，還有毒力相關的功能基因被顯著富集了。整體上看，海綿共生的微生物群落被轉變成耐銅的具有致病性的微生物群落。

海綿是最原始的後生動物，並且與海綿特異性的共生微生物群落密切相關。硫還原和硫氧化細菌參與的硫循環在海綿體內發揮重要作用。然而，這些細菌的具體生理特徵尚未研究清楚。我們首次分析一個幾乎完整的海綿體內共生的硫氧化細菌基因組（利用以上兩個宏基因組資料）。這個硫氧化細菌具有相似的共同祖先。它在糖酵解代謝中使用 polyphosphate glucokinase，而這個酶以古老的磷酸來源 polyphosphate 為唯一底物。轉座基因在它的基因組中幾乎缺失。以上結果表明這個細菌在很久以前同海綿形成共生關係，並可能與古老的海綿共同進化。這個細菌特異性出現在海綿體內，並且具備硫氧化的能力（可以保護宿主海綿免受硫化物毒性），而且它的基因組中具有豐富的共生相關蛋白（(ankyrin repeats protein, 使細菌免受宿主海綿消化），這些證據表明這個細菌是海綿中的共生菌。另外，與親緣關係最近的自由生活的細菌相比，它的基因組中毒力基因大幅度被刪減，可能與共生關係形成有關。更有趣的是，這個細菌除了在海綿體內合適的環境中自養生存以外，與近緣細菌相比，它還具備異養生活的能力：具有吸收並利用環境中各類碳水化合物（糖類，氨基酸，肽類，芳香族化合物）的功能基因。這種自養和異養兼備的生活方式使得這個細菌具有較強的競爭力，從而成為海綿微生物群落中的主要的細菌。



Taxonomic profiles of bacterial communities in the copper treated sponges and the controls.



Comparison of sulfur cycling pathways among the five genome: *Ruthia magnifica* Cm (the first box), *Vesicomyosocius okutanii* HA (the second box), *Candidatus Thioalkalivibrio spongium*(the third box), *Thioalkalivibrio nitratireducens* DSM 14787 (the fourth box), and *Thioalkalivibrio sulfidophilus* (the fifth box). Black color represents presence of the genes and white absence.

Research Output

Nil

Apr 2012 – Mar 2015 (Ongoing)

HEALTH RISK ASSESSMENTS OF RESIDENTS IN THE PEARL RIVER DELTA EXPOSED TO BROMINATED FLAME RETARDANTS (BFRS)

在珠江三角洲暴露於防火劑的健康風險評估

Ming Hung WONG, Y. LIANG, Chris K.C. WONG, Y.B. MAN, H.S. WANG, S.C. WU, Paul K.S. LAM, Paul D. JONES, John P. GIESY

Rodent studies indicate that PBDEs may be detrimental to neurodevelopment, possibly by lowering thyroid hormone concentrations in blood. In the present study, we determined concentrations of PBDEs in human milk, placenta, neonatal serum and urine. Thirty sets of samples from five cities (six sets samples of each) of the Pearl River Delta (PRD) were obtained and analyzed using gas chromatographic mass spectrometry. The concentrations of total PBDEs found in placenta ranged from 1.56 to 110 ng/g lipid, neonatal serum samples 14 to 260 ng/g lipid, human milk 1.92 to 58.9 ng/g lipid, and neonatal urine 3.56 to 113 ng/g lipid, respectively. Individual neonatal serum and urine concentrations did not differ from the corresponding maternal concentrations in both placenta and milk, indicating that measurement of maternal PBDE placenta and milk levels is useful in predicting fetal exposure. In accordance with relevant reports on other biological samples, BDE-47 and BDE-99 were the dominant congeners of total PBDE contained in human milk, placenta, neonatal serum and urine. The concentrations of PBDEs found in the present study were comparable to other studies conducted in China and other Asian countries, but lower than developed countries such as the USA and United Kingdoms. Our study shows that human fetuses in the PRD were exposed to moderate levels of PBDEs. Further investigation is required to determine if these levels are specific to the South China and to assess the toxic potential of these exposure levels.

研究結果表明 PBDE 能夠影響胎兒的神經發育及甲狀腺激素水準。本研究測定了 PBDE 在母乳、胎盤、以及新生兒血液及尿液中的濃度。我們收集了位於珠三角五個主要城市的 30 套人體樣本，並利用 GC/MS 測定了 PBDE 的濃度，發現 PBDE 的濃度在胎盤中為 1.56 to 110 ng/g lipid，新生兒血液中為 14 to 260 ng/g lipid，母乳中為 1.92 to 58.9 ng/g lipid，新生兒尿液中為 3.56 to 113 ng/g lipid。其中新生兒血液及尿液中的 PBDE 濃度與其對應的母體胎盤及乳汁中的濃度呈統計學（$p>0.05$）正相關，從而表明可以通過監測母體胎盤或乳汁中的濃度從而預測新生兒暴露於 PBDE 的情況。與以往研究類似，BDE-47 和 BDE-99 是母嬰組織樣本中 PBDE 的主要同系物。結果表明珠三角人體樣本中 PBDE 的濃度于我國其餘地方及亞洲其餘國家報導的濃度相近，但顯著低於發達國家如美國、英國等的濃度。研究發現珠三角的新生兒暴露於中等濃度的 PBDE 水準。其對胎兒發育和新生兒健康的影響有待進一步研究。

SCRF

Research Output

Papers with the SKLMP included as the first affiliation 以 SKLMP 為第一單位的期刊論文：

1. Wang, W., Wu, F.Y., Huang, M.J., Kang, Y., Cheung, K.C., Wong, M.H. (2013)
Size fraction effect on phthalate esters accumulation, bioaccessibility and in vitro cytotoxicity of indoor/outdoor dust, and risk assessment of human exposure.
Journal of Hazardous Materials, 261:753-762.
2. Choi, W.M., Mo, W.Y., Wu, S.C., Mak, N.K., Bian, Z.X., Wong, M.H. (2013)
Effects of traditional Chinese medicines (TCM) on the immune response of grass carp (*Ctenopharyngodon idellus*). *Aquaculture International*, (in press)

Papers with the SKLMP as one of the affiliations 以 SKLMP 為作者單位之一的期刊論文：

1. Cheng, Z., Wang, H.S., Du, J., Sthiannopkao, S., Xing, G.H., Kim, K.W., Mohamed Yasin, M.S., Hashim, J.H., Wong, M.H. (2013)
   Dietary exposure and risk assessment of mercury via total diet study in Cambodia.
   Chemosphere, 92:143-9.
2. Cheng, Z., Man, Y.B., Nie, X .P., Wong, M.H. (2013)
   Trophic relationships and health risk assessments of trace metals in the aquaculture pond ecosystem of Pearl River Delta, China. *Chemosphere*, 90:2142-8.
3. Cheng, Z., Nie, X.P., Wang, H.S., Wong, M.H. (2013)
   Risk assessments of human exposure to bioaccessible phthalate esters through market fish consumption.
   Environment International, 57-28:75-80.
4. Man, Y.B., Chow, K.L., Kang, Y., Wong, M.H. (2013)
   Mutagenicity and genotoxicity of Hong Kong soils contaminated by polycyclic aromatic hydrocarbons and dioxins/furans. Mutation Research - Genetic Toxicology and Environmental Mutagenesis, 752:47-56.
5. Man, Y.B., Kang, Y., Wang, H.S., Lau, W., Li, H., Sun, X.L., Giesy, J.P., Chow, K.L., Wong, M.H. (2013)
   Cancer risk assessments of Hong Kong soils contaminated by polycyclic aromatic hydrocarbons.
   Journal of Hazardous Materials, 261:770-6.
6. Wang, H.S., Jiang, G.M., Chen, Z.J., Du, J., Man, Y.B., Giesy, J.P., Wong, C.K., Wong, M.H. (2013)
   Concentrations and congener profiles of polybrominated diphenyl ethers (PBDEs) in blood plasma from Hong Kong: Implications for sources and exposure route. *Journal of Hazardous Materials,* 261:253-9.

Papers with the SKLMP grant or support acknowledged 致謝 SKLMP 支持的期刊論文：

Nil

Papers with the SKLMP partial support SKLMP 部份參與的期刊論文：

1. Liu, J.L., Wong, M.H. (2013)
   Pharmaceuticals and personal care products (PPCPs): A review on environmental contamination in China.
   Environment International, 59:208-24.
2. Wang, H.S., Sthiannopkao, S., Chen, Z.J., Man, Y.B., Du, J., Xing, G.H., Kim, K.W., Mohamed Yasin, M.S., Hashim, J.H., Wong, M.H. (2013)
   Arsenic concentration in rice, fish, meat and vegetables in Cambodia: a preliminary risk assessment.
   Environmental Geochemistry and Health, 35(6):745-755.
3. Wang, H.S., Chen, Z.J., Cheng, Z., Du, J., Man, Y.B., Leung, H.M., Giesy, J.P., Wong, C.K., Wong, M.H. (2013)
   Aquaculture-derived enrichment of hexachlorocyclohexanes (HCHs) and dichlorodiphenyltrichloroethanes (DDTs) in coastal sediments of Hong Kong and adjacent mainland China.
   Science of the Total Environment, 466-467C:214-20.

Academic Meetings/Conferences
學術會議/講座

The State Key Laboratory in Marine Pollution (SKLMP) The Third Academic Committee Meeting
海洋污染國家重點實驗室第一屆學術委員會第三次會議

The State Key Laboratory in Marine Pollution (SKLMP) Third Academic Committee Meeting was held on 14 January, 2013 at the City University of Hong Kong Shenzhen Research Institute. The meeting was mainly composed of three parts: (1) the SKLMP Internal Research Fund Program Presentation, (2) the Director's Report and (3) the Academic Committee Meeting. In the meeting, Laboratory Director Prof. Paul Kwan-sing Lam reported the development and achievements of the laboratory over the past year, and members of the laboratory also reported on their most highlighted research work over the past year. The meeting also invited Prof. Ionan Marigomez, Prof. Miren P. Cajaravillea and Dr. Mireille Chinain to report on The Experimental Marine Biology and Biotechnology Research Center (PIE): Specimen Banking, Main Research Lines, Consequences of Emerging Pollutants for Marine Ecosystem Health and Ciguatera Research in French Polynesia: Major Outcomes, respectively. This meeting further strengthened academic exchange between the SKLMP and outstanding scientists of the world.

海洋污染國家重點實驗室第一屆學術委員會第三次會議於 2013 年 1 月 14 日在香港城市大學深圳研究院舉行。會議主要由 SKLMP 項目工作報告、主任工作報告及學術委員會評議三部份組成。會議中，實驗室主任林群聲教授向學術委員會匯報了實驗室過去一年的發展與成果，實驗室成員也報告了過去一年各自最具亮點的研究工作。會議還特邀了 Prof. Ionan Marigomez, Prof. Miren P. Cajaraville, Dr. Mireille Chinain 分別以題為 The Experimental Marine Biology and Biotechnology Research Center (PIE): Specimen Banking, Main Research Lines, Consequences of Emerging Pollutants for Marine Ecosystem Health, Ciguatera Research in French Polynesia: Major Outcoms 進行了報告，進一步加強了實驗室與全球各地優秀科學家的學術交流。

The 2nd Xiangjiang Marine Forum - Underwater Observation Techniques & Methods
香江論壇第二講 - 水下在線觀測技術與方法

On 22 March, 2013, the Second Xiangjiang Marine Forum – Underwater Observation Technique and Method was hosted by the Shenzhen Marine Research and Technology Consortium (SMART) and sponsored by the City University of Hong Kong State Key Laboratory in Marine Pollution and the Center for Ocean Technology, Tsinghua University. The workshop came to an end with the topic of underwater observation techniques and methods. The opening ceremony was presided over by Mrs. Wang Ning, the Director of the Management Service Center of Shenzhen Virtual University Park.

The forum had strong support from many Shenzhen government departments, Ocean Administration of Shenzhen Municipality, Science, Technology and Innovation Commission of Shenzhen Municipality, Shenzhen Marine Environment and Resources Monitoring Centre, and the relevant leaders of units attended the opening ceremony. Over a hundred experts, scholars, industry researchers, R&D staff and students from different research institutes and universities gathered at this Second Xiangjiang Forum. In-depth exchanges and discussions were held on topics concerning underwater observation techniques and technical demands for solving major problems in marine science.

The success of the Second Xiangjiang Marine Forum has strengthened the exchanges between SMART members and domestic leading marine institutes. This has promoted interdisciplinary exchanges, improved comprehension, and promoted collaborative innovation. The forum concluded that the current domestic underwater observation instruments have not yet been developed into complete industrial equipment, and there is still much room for development. Due to the well-developed manufacturing and IT industry in Shenzhen, development of the ocean observing instrumentation industry has good prospects.

2013年3月22日，由深圳海洋研究與技術聯盟(SMART)主辦，香港城市大學海洋污染國家重點實驗室和清華大學深圳研究生院海洋技術研究中心聯合承辦，以水下在線觀測技術與方法為主題的香江海洋論壇第二講圓滿落幕。深圳虛擬大學園管理服務中心主任、SMART秘書長王寧主持了開幕式。

論壇得到了深圳市眾多政府部門的大力支持，深圳市海洋局、科創委、海洋環境與資源監測中心等單位相關領導都出席了開幕式。來自眾多研究機構及高校的百餘名專家、學者、業內研究人士、技術研發人員和在校學生齊聚香江海洋論壇，圍繞水下觀測技術以及解決海洋科學重大問題所面臨的技術需求進行了深入的交流和探討。

香江海洋論壇的成功舉辦，加強了SMART成員之間以及和國內領先海洋機構的交流，促進了學科交叉，提高了綜合水準，推動了協同創新。論壇得出結論，目前國內水下觀測儀器裝備尚未形成完整的產業，仍有較大發展空間，深圳因具有發達的製造業和訊息產業，有發展海洋觀測儀器裝備產業的前景。

The 3rd Xiangjiang Marine Forum - Ocean Oasis Brainstorming
香江海洋論壇第三講 - 海洋綠舟建設集思會

On 20 July, 2013, the Third Xiangjiang Marine Forum - Ocean Oasis Brainstorming hosted by Shenzhen Marine Research and Technology Consortium (SMART) and sponsored by the City University of Hong Kong State Key Laboratory in Marine Pollution, ZTE Holdings Co., Ltd., the Center for Ocean Technology, Tsinghua University was held at Shenzhen Virtual University Park. Nearly 60 experts and scholars surrounded the observation platform of "Ocean Oasis" and discussions were held on topics about hydrology, biochemical indices and biological resources monitoring. Professors, scholars, and other professionals participated in the forum which was involved with marine biology, environmental chemistry, ecotoxicology, medical equipment, data transmission and communication, bio-sensors and microfluidics, mass spectrometry, online polarized light and laser ray high-definition imaging system, flow cytometry, etc.

SMART has successfully organized a number of activities, mostly in an academic reporting format. This is different from the past, and it is good to have a new attempt using this form of brainstorming discussion to collect scientific knowledge and to achieve results through the exchange of ideas. So far, SMART is developing

step by step, and in order to achieve a sustainable development, the union needs to have exchanges via all kinds of academic seminars, and implement what needs to be done, and only when these things are done, will the development of the union have an internal driving force. SMART will find new directions and paths from various activities for its development, and the Shenzhen Virtual University Park will continue to spare no effort to help SMART promote exchanges in the field of marine activities, and form new results and industries to promote and develop new industry in Shenzhen.

2013年7月20日，由深圳海洋研究與技術聯盟(SMART)主辦，香港城市大學海洋污染國家重點實驗室、深圳市中興新通訊設備有限公司、清華大學海洋技術研究中心、清華大學深圳研究生院海洋學部承辦的香江海洋論壇第三講—海洋綠舟(Ocean Oasis, O2)建設集思會在深圳虛擬大學園隆重召開。近六十名專家學者，圍繞擬建設的「海洋綠舟」觀測平臺在水文、生化指數、生物資源等監測方面展開討論。參與的教授、學者涉及的專業有海洋生物、環境化學、生態毒理、醫療器械、數據傳輸及通訊、生物感測器及微流控、質譜、在線偏振光及激光光片高速 - 高清成像系統、流式細胞計數等。

SMART 已經成功舉辦多次活動，多為學術報告形式。此次有別與以往，採用頭腦風暴的形式開展討論，集合了不同學科力量，通過交流碰撞獲得成果。SMART 在形散神聚的狀態下一步步發展至今，聯盟的永續發展需通過各類學術研討會之間的交流把可實現的項目、需要做的事情落實，只有先把事情做起來，聯盟的發展才有前進的內在驅動力。

SMART 將從各類活動中為自身的發展找到新的方向與路徑，深圳虛擬大學園也將一如既往、不遺餘力的為 SMART 促進海洋領域的交流活動，形成新的成果和產業，推動深圳未來新興產業的發展。香港城市大學海洋污染國家重點實驗室作為 SMART 的發起單位與中堅力量，將不遺餘力地推動 SMART 的茁壯成長。

Review of Major Events
實驗室大事回顧

The 2012 State Key Laboratory in Marine Pollution (City University of Hong Kong) & State Key Laboratory of Marine Environmental Science (Xiamen University) Annual Meeting

海洋污染國家重點實驗室（香港城市大學）
近海海洋環境科學國家重點實驗室（廈門大學）2013 聯合年會

On 10 to 14 January, 2013, the 2012 State Key Laboratory in Marine Pollution (City University of Hong Kong) and the State Key Laboratory of Marine Environmental Science (MEL) (Xiamen University) Annual Meeting was held in the City University of Hong Kong, Research Institute Building. More than 220 guests from state and local departments of science and technology, academic institutes from home and abroad attended the meeting. The experts had in-depth discussions on major topics of marine ecological procedures/mechanisms/effects, carbon and nitrogen biogeochemistry cycling and observational technology, marine dynamic processes, estuarine pollutant biogeochemistry and toxicology, and environmental changes and the coral reef system, in order to contribute to the development of Chinese marine science.

During the meeting, MEL and the SKLMP jointly hosted a 2013 new year party. The staff from the two state key laboratories gave an excellent performance on stage, and wished that the laboratories be even more magnificent in the new year.

2013 年 1 月 10 日至 1 月 14 日，海洋污染國家重點實驗室（香港城市大學）-近海海洋環境科學國家重點實驗室（廈門大學）在香港城市大學（深圳）產學研大樓共同舉辦了聯合年會，來自海內外海洋領域的專家學者、國家與地方科技主管部門的領導出席了此次會議。整個會議期間的參會人數總計超過 220 人，各專家圍繞海洋生態過程/機制/效應、碳氮生物地球化學迴圈與觀測技術、海洋動力過程、河口污染物生物地球化學及毒理學、環境變化與珊瑚礁系統等海洋科學問題進行了廣泛而深入的討論和交流，共同為中國海洋事業的發展貢獻力量。

會議期間，廈門大學近海海洋環境科學國家重點實驗室還聯同香港城市大學海洋污染國家重點實驗室組織策劃了 2013 年迎新聯歡會。兩個國家重點實驗室的工作人員在舞臺上傾情演出，其樂融融，祈願新的一年齊頭並進，再創佳績。

The Inauguration of Shenzhen Marine Research and Technology Consortium (SMART)
深圳海洋研究與技術聯盟成立儀式

On 12 January 2013, a ceremony was held at the CityU Shenzhen Research Institute (SRI) to mark the launch of the Shenzhen Marine Research and Technology Consortium (SMART). Initiated by the Shenzhen Virtual University Park, the Consortium was established by the State Key Laboratory in Marine Pollution (SKLMP) of the City University of Hong Kong (CityU) together with 11 prominent universities and research institutes. The Research Centre for the Oceans and Human Health (H2O), which is the satellite division of the SKLMP in mainland China, co-organized this activity.

More than 200 guests and representatives from member institutes of SMART, government departments, academic institutes and business enterprises attended the ceremony. Guests of Honor included Academician Su Jilan from the Second Institute of Oceanography of the State Oceanic Administration; Academician Hu Dunxin from the Institute of Oceanology of the Chinese Academy of Sciences; Academician Jiao Nianzhi from the College of Oceanography and Earth Sciences at Xiamen University; Mr. Ren Jianguo, Director of Division IV (marine science) of the Department of Earth Sciences of the National Natural Science Foundation of China; Mrs. Qiu Xuan, Vice-Director of the Science, Technology and Innovation Commission of Shenzhen Municipality; Prof. Lu Jian, Dean of CityU's College of Science and Engineering; Prof. Cheng Shuk-han, Director of CityU's Office of Education Development and Gateway Education; Prof. Donald Anderson from Woods Hole Oceanographic Institution (WHOI) of the USA; Prof. George Iwama, President of the University of Northern British Columbia in Canada; Prof. John Giesy, Fellow of the Royal Society of Canada; and Mrs. Molly Kung, Executive Director of the Chinachem Group in Hong Kong.

The Consortium will focus on marine science studies, with the objective of promoting innovative development in related fields. Prof. Paul Kwan-sing Lam, the Director of the SKLMP and H2O, said, "I'm delighted that the model of SKLMP has been adopted as a blueprint for the formation of SMART. It means that the model of consolidating resources and talent of marine science from various institutes can be expanded by SMART. A much more powerful synergy can be formed to lay a solid foundation for innovative research and development of marine science in China."

During the ceremony, Academician Su and Prof. Lam were appointed as the Director-General and Deputy Director-General of SMART. Members of the Academic Advisory Committee include Academician Su, Academician Ni Jiazuan, Academician Lin Haoran and other academicians.

由深圳虛擬大學園發起，香港城市大學海洋污染國家重點實驗室(SKLMP)及其分支機構海洋與人類健康研究中心(H2O)，聯合清華大學、中國科學院深圳先進技術研究院、廈門大學、深圳大學、北京大學等 11 所高等院校及研究機構，攜手成立深圳第一個海洋研究與技術聯盟(Shenzhen Marine Research and Technology Consortium 英文簡稱 SMART)。成立儀式於 1 月 12 日在香港城市大學（深圳）產學研大樓舉行。

國家海洋局第二海洋研究所蘇紀蘭院士、中國科學院海洋研究所胡敦欣院士、廈門大學海洋與地球學院焦念志院士、國家自然科學基金地球科學部海洋處任建國處長、深圳市科技創新委員會邱宣副主任、香港城市大學科學及工程學院呂堅院長及教育發展及精進教育處鄭淑嫻處長、美國伍茲霍爾海洋研究所(WHOI) Donald Anderson 教授、加拿大英屬北哥倫比亞大學校長 George Iwama 教授、加拿大皇家學會院士 John Giesy 教授、香港華懋集團執行董事龔中心女士、各聯盟成員單位的代表等，總計有來自各政府部門、學術界、企業界等超過 200 位人士共同見證了深圳海洋研究與技術聯盟的成立儀式。

SMART 主要從事海洋科學研究，以期促進相關產業及領域的創新。聯盟的主要發起人、SKLMP 和 H2O 的主任林群聲教授說：「我對 SMART 的成立是以 SKLMP 作為藍本感到驕傲，這證明以彙集多院校海洋環境科學研究精英及資源分享的模式，可以藉 SMART 擴散出去，形成一股更強更大的力量，為中國海洋科學研究協同創新及進一步發展打好堅實的基礎！首先我們希望聚集深圳從事海洋研究的各所高等院校與研究機構的力量，因應深圳市在海洋生態保護及生態安全、海洋資源的永續開發與利用等方面的社會需求，開展海洋科學技術研發與自主創新研究，促使深圳市早日成為國家海洋經濟科技發展的模範城市，增強對海洋資源的開發能力和應用技術，加速海洋經濟的發展及海洋生態環境的保護。」

該聯盟由國家海洋局第二海洋研究所蘇紀蘭院士擔任首屆理事長，林群聲教授擔任首屆常務副理事長，蘇紀蘭、倪嘉纘、林浩然等多位院士為學術委員會委員。

The Plaque Unveiling Ceremony of the Research Centre for the Oceans and Human Health
海洋與人類健康研究中心揭牌

The Research Centre for the Oceans and Human Health (H2O) is a division of the State Key Laboratory in Marine Pollution in mainland China. The research centre was established on 14 January, 2013 and aims to fulfill the needs of social development in Shenzhen and Hong Kong as well as to contribute to the protection of marine environment and human health in other mainland cities and to facilitate the sustainable development of the marine industry. The establishment of H2O also aims to raise public awareness regarding marine environmental protection in the Pearl River Delta region by promoting different marine conservation activities. The outcomes generated from our centre not only contribute to the current knowledge of the marine environment, but also provide valuable scientific data for policy-makers to further improve the sustainability of local marine ecosystems and the safety of marine food supply, which would definitely protect human health and our precious marine resources, as well as maintain a prosperous society. At the ceremony, Prof. Arthur CT Chen gave the opening speech for H2O, Director Prof. Paul Kwan-sing Lam and Prof. Tao Shu presented letters of appointment to the academic members who attended the first academic committee meeting.

海洋與人類健康研究中心（H2O）作為香港城市大學海洋污染國家重點實驗室在內地設立的衛星機構於2013年1月14日正式成立，並舉行了隆重的揭牌儀式。H2O的成立將在推動珠江三角洲內的海洋環境保護、提升海產品的食用安全、維持社會長治久安以及保護公民身體健康和珍貴的海洋資源等方面做出重要貢獻。該中心的成立不僅迎合深圳和香港社會發展的需要，而且可以為內地其他省市的海洋環境保護和保障人類健康以及促進海洋產業的可持續發展。會上，陳鎮東教授為H2O的開幕致辭，中心主任林群聲教授以及陶澍院士向H2O的第一屆學術委員會的到場委員頒發聘書。

The Opening Ceremony of the Research Centre for the Oceans and Human Health (H2O)
海洋與人類健康研究中心（H2O）舉行開幕儀式

On 11 October, 2013, the opening ceremony of the Research Centre for the Oceans and Human Health (H2O) was held in the City University of Hong Kong, Shenzhen Research Institute (SRI).

The Director of Shenzhen Virtual University Park Management Service Center Mrs. Wang Ning; the Deputy Director General of the Shenzhen Science and Technology Innovation Commission of Shenzhen Municipality Mr. Zhang Aimin; the Director of Shenzhen Marine Environment and Resources Monitoring Centre Mr. Zheng Zhiwen; Graduate School at Shenzhen, Tsinghua University Prof. Ma Hui and Prof. Cai Zhonghua; Shenzhen Institute of Advanced Technology, Chinese Academy of Science Researcher Jiang Qingshan; the Executive Manager of City University of Hong Kong Shenzhen Research Institute Ms. Yu Hong; and others attended the opening ceremony. The opening ceremony marked H2O's official start in the City University of Hong Kong, Research Institute Building and provides a solid backing for the State Key Laboratory in Marine Pollution to carry out marine research in the mainland.

In the opening ceremony, Dr. Leo Lai Chan, the Deputy Director of H2O, expressed his sincere thanks for the support and help from community leaders and friends, and reported on the laboratory's achievements since its establishment. Director Wang Ning, Deputy Director Zhang Aimin, Director Zheng Zhiwen and other guests expressed their congratulations, and hopes that H2O would cause oceans and human health research centres to boom!

2013 年 10 月 11 日，海洋與人類健康研究中心（H2O）在香港城市大學深圳研究院舉行開幕儀式。

深圳虛擬大學園管理服務中心王寧主任、深圳市科技創新委員會張愛民副處長、深圳市海洋環境與資源監測中心鄭志文主任、清華大學深圳研究生院馬輝教授、清華大學深圳研究生院蔡中華教授、中科院深圳先進技術研究院姜青山研究員、香港城市大學深圳研究院執行經理余紅女士等嘉賓撥冗出席。此次開幕儀式標誌著海洋與人類健康研究中心正式入駐香港城市大學產學研大樓，同時也為海洋污染國家重點實驗室在內地開展海洋研究提供了堅實的後盾力量。

開幕儀式上，H2O 常務副主任陳荔博士作開幕致辭，對支持和幫助海洋與人類健康研究中心成立和成長的各界領導和朋友表示由衷的感謝，並匯報了 H2O 自 2012 年揭牌以來取得的可喜成績。王寧主任、張愛民副處長、鄭志文主任等嘉賓紛紛致辭表達祝賀，並祝福海洋與人類健康研究中心的事業蒸蒸日上。

Spotlights 年度焦點

DEVELOPMENT AND APPLICATION OF A NOVEL LIGHT SHEET-BASED MICROSCOPIC FLOW CYTOMETER FOR HARMFUL ALGAL BLOOM (HAB) MONITORING AND MANAGEMENT

新型激光光片顯微流式細胞術開發及應用于有害藻華的監測及管理

Prof. Paul Kwan Sing LAM & Dr. Robert Kai Yiu CHAN

林群聲 教授　　陳啟堯 博士

Coastal and fresh waters of Hong Kong and mainland China are increasingly impacted by harmful algal blooms (HABs). The frequency, spatial extent, and economic impact of HABs have dramatically expanded in recent decades. One major objective of HAB research and monitoring programs has therefore been to develop rapid and accurate methods for HAB cell identification and enumeration, as there are clear economic and managerial benefits from HAB detection, warning, and forecasting. Here we propose a multi-investigator project that seeks to test, refine, and ultimately commercialize a promising optical technique for algal cell identification and enumeration in natural waters – laser-sheet, fast fluorescence microscopy, termed Psi-Fi, an acronym for Phytoplankton Species Identification by Fluorescence Imaging. It represents a significant technological advance in sample volume throughput over existing designs while still maintaining diffraction-limited image quality. The outcomes from the proposed activities will not only contribute to the advancement of Psi-Fi technology, but also enable in situ, real-time algal bloom monitoring at unprecedented levels of detail. The type of data that will be produced by the Psi-Fi is needed to facilitate the mitigation of economic and social impacts from HABs and to improve the management of drinking water and fisheries resources.

近年來，香港、中國大陸、甚至全世界的沿海及淡水湖泊受有害藻華（HABs）的影響逐年加劇。赤潮發生的次數、範圍及所造成的經濟損失快速增長。開發赤潮藻細胞快速準確的鑒定及定量方法是赤潮研究與監測的主要目標。對赤潮進行監測、預警及預報具有顯而易見的經濟及管理效益。本項目將測試及優化一種可對自然水域中的藻細胞進行鑒定及定量的快速激光光片顯微流式細胞術並最終將其商業化。本技術具有顯著的技術優勢，在高樣品通量的同時能保持高品質的圖像，能為原位即時的赤潮監測提供更多資料。獲得的資料將能緩解赤潮對經濟及社會造成的影響，同時改善飲用水和漁業資源的管理品質。

Proposed budget 申請金額：

HK$24,891,750

PROJECT IN APPLICATION

Fish Raft Application for Near-shore Marine Station

申請魚排建設臨海實驗站

Prof. Paul Kwan Sing LAM

林群聲 教授

The State Key Laboratory in Marine Pollution will cooperate with high-level research teams from Hong Kong, mainland China and Taiwan to promote the development of high-tech aquaculture in Hong Kong. Three Hong Kong mariculture zones were selected to be the first near-shore marine stations in the project. With the purpose of developing high quality, efficient and environmentally friendly modern aquaculture, we plan to carry out the following work: **1. FRY PRODUCTION** Introduce economic Pre-immunized Specific Pathogen Resistant (PI-SPR) early-hatched fry for in order to provide high-quality fry or juveniles of economically important grouper species to local fish farmers; **2. PREVENTION AND CONTROL OF FISH DISEASES** We plan to import fish virus (nervous necrosis virus iridescent virus) vaccines for injection or oral use and rapid virus detection kits from Taiwan for the control of fish diseases, as well as to develop disease-resistant and growth-stimulating fish feed in cooperation with researchers from Taiwan. **3. WATER QUALITY MONITORING** A technology of light sheet-based microscope flow cytometry, namely Phytoplankton Species Identification by Fluorescence Imaging (Psi-Fi), has been developed by our team to identify algal cells and to detect size distributions and biomass. Based on cooperation with Prof. Bi Hongsheng of the University of Maryland, we plan to monitor the identification and biomass of zooplankton using this zooplankton imaging system. Moreover, we will detect the composition and concentration of microorganisms and marine pollutants regularly. Comprehensive monitoring of the aquaculture environment will provide early warning signals of water quality degradation and red tide, and help us to improve the quality of fishery resource management. **4. ECOLOGICAL FARMING** Establish an ecological farming system involving fish cage culture, macroalgal culture and shellfish culture. Based on the assessments of growth rate, quality of seafood and environmental factors, we will establish an ecological farming system suitable for Hong Kong mariculture zones. **5. EQUIPMENT DEVELOPMENT** Establish a multifunction laboratory on fish rafts; develop and install environmentally friendly equipment supported by green energy (such as wind and solar) for all the aquaculture and laboratory facilities; design and develop deep-sea cages equipped with underwater sonar systems; optimize high-tech environmental monitoring equipment for fish raft aquaculture. **6. SERVICE AND PRODUCT PROMOTION** Invite and employ fishermen affected by the local trawling ban to join the project, thus making a contribution to the nurturing of a new generation of fishermen. The laboratory on the fish rafts will be open to nearby fishermen for emergency testing and analysis, and we will provide technical guidance and new products, such as fish, vaccines, food, farming equipment, etc. to local fish farmers.

海洋污染國家重點實驗室將聯合兩岸三地高水平科研團隊，以香港海魚養殖區為試驗基地，開展鼎力合作，推動高科技海魚養殖業的發展。我們將秉承綠色節能以及優質高效的理念，開展如下工作：**1. 魚苗生產**。由臺灣引進 PI-SPR（Pre-immunized Specific Pathogen Resistant）石斑魚苗開展名貴品種石斑魚的中間育成，以抗病抗逆的優質魚苗或幼魚作為生產產品提供給當地養殖戶; **2. 魚病防控**。由臺灣引進商品化魚病病毒（如神經壞死病毒和虹彩病毒）注射用/口服用疫苗以及病毒快速檢測試劑盒，實地開展魚苗病害防治與檢測。與臺灣地區科研機構聯合開發抗病增產的優質餌料產品； **3. 水環境監測**。利用本團隊研發的快速激光光片顯微流式細胞儀對養殖水域中的藻細胞進行快速實時的鑒定及定量，同時將與馬裡蘭大學的畢洪生教授合作，採用其浮游動物可視化和成像系統對浮遊動物的種類及數量進行辨別，以及雙射頻識別聲納實時對魚類及其動向進行識別，定期檢測微生物與海洋污染物的組成與含量。通過養殖環境的綜合檢測，來預警養殖水質的惡化與赤潮的暴發，進而提高漁業資源的管理品質. **4. 生態養殖**。以試驗期的規模建立魚類、藻類和貝類共養的生態養殖模式。結合養殖生物生長、品質以及水環境調查，提出適宜香港海域的石斑魚生態養殖方法。**5. 設備開發**。建立海面實驗室，開發環保新能源設備，為海面實驗室與養殖設施提供綠色能源（如風能以及太陽能）。在允許條件下，開發配有水下聲納設備的深海網箱，進一步優化適用於魚排養殖環境的高科技環境監測儀器；**6. 服務與產品推廣**。盡量聘請受禁拖網影響的漁民參與該項目，提高年輕漁民子弟的科技化養殖意識。開放海上實驗室，用於突發事件應急檢測，為當地養殖戶提供新技術（如生態養殖技術）與新產品（如魚苗、疫苗、優質餌料和綠色能源設備等）。

申請中項目

Ecosystem Disruptive Toxic Alga (EDTA)

干擾生態系統的有毒藻類

Prof. Paul Kwan Sing LAM

林群聲 教授

Under the leadership of Director Prof. Paul K.S. Lam and Deputy Director Dr. Leo L. Chan of the Research Centre for the Oceans and Human Health (H2O), and, the Shenzhen Toxic Algae Research (STAR) team was established in 2013. The mission of the STAR team is: (1) to isolate and identify ecosystem-disruptive toxic alga (EDTA) in Chinese and global waters, (2) to investigate the ecology of EDTA and (3) to examine the ecological and human health impacts associated with EDTA. The ultimate goal of the STAR team is to provide novel insights into the establishment of reliable, effective and straightforward management practices for policy makers and/or governments to minimize mitigate and eliminate impacts caused by EDTA, especially benthic and epiphytic toxic alga.

Recently, the STAR team has achieved a breakthrough in research on ciguatera fish poisoning (CFP), purifying Pacific ciguatoxins (P-CTXs) for the development of quantification methods to screen ciguatoxic fishes. Liquid chromatography-tandem mass spectrometry (LC-MS/MS) methods to quantify P-CTXs in fish muscle have been developed, optimized and validated with a limit of quantification of P-CTX-1, the most toxic P-CTX, of 0.5 pg/g in fish muscle, which is 20-times lower than those of previously published analytical methods. An analytical method has also been developed to simultaneously identify and quantify P-CTX-1, P-CTX-2 and P-CTX-3 in fish blood which provides a better and less destructive means of screening live coral reef fishes. The team members have been to a CFP-endemic island nation, the Republic of Kiribati, in the Central Pacific Ocean to carry out field-based studies to examine the food web transfer of CTXs in a coral reef ecosystem. The successful isolation and identification of 25 strains of benthic dinoflagellates, *Gambierdiscus* spp., provided the crucial materials (1) for characterization of key environmental factors that promote the growth of and CTX-production by *Gambierdiscus* spp. and (2) for development, optimization and validation of key techniques for mass culture of *Gambierdiscus* spp. to isolate and purify CTXs as authentic standards. Based on field observations (including graze marks, grazing pattern of herbivorous fishes, and isolation of *Gambierdiscus* spp. from dead coral) and preliminary results from several toxicity experiments (application of an isotope mixing model to identify the dietary composition of fishes, effects of P-CTX-1 in the marine medaka (*Oryzias melastigma*), effects of P-CTX-1 in liver cells (GL-a) of orange-spotted grouper (*Epinephelus coioides*) and juvenile orange-spotted grouper), we propose to assess the ecosystem-disruptive potential of *Gambierdiscus* spp. by studying the sources, dynamic

and fates of CTXs, as well as performing field surveys on the biodiversity of CFP-endemic coral reefs and laboratory studies to identify CTX-sensitive and -resistant organisms. The findings of the proposed project will not only shed light on the establishment of field-based strategies to manage fishery resources, but also provide crucial evidence and information for governments to manage and prevent CFP.

In addition to the CFP research, the STAR team aimed to develop innovative chemical, biological and engineering technologies for the early detection, assessment, prediction and control of harmful algal blooms (HABs) that impact the freshwater and marine environment. Light sheet-based microscope flow cytometry has been applied in the development of a technique called **P**hytoplankton **S**pecies **I**dentification by **F**luorescence **I**maging (Psi-Fi) to identify algal cells and to detect size distributions and biomass of phytoplankton which enable in situ, real-time algal bloom monitoring. Its application and deployment in Lake Tai to monitor cyanobacterial blooms has been supported by the Environmental Protection Department of Jiangsu Province.

There are seven international scholars from six universities and research institutes from the U.S., French Polynesia and Taiwan (including Woods Hole Oceanographic Institution, the U.S.; Louis Malardé Institute (ILM) of Tahiti, French Polynesia; Institute of Fisheries Science, National Taiwan University; National Research Institute of Chinese Medicine of Ministry of Health and Welfare of Taiwan; Institute of Biotechnology of National Cheng Kung University, Taiwan) to act as the International Advisory Panel of the STAR team. Since its inception in 2013, the STAR team has successfully attracted more than HK$5M of research funding from Hong Kong and Mainland China covering a number of different areas, with several new proposals currently under development.

& Dr. Leo Lai CHAN
陳荔 博士

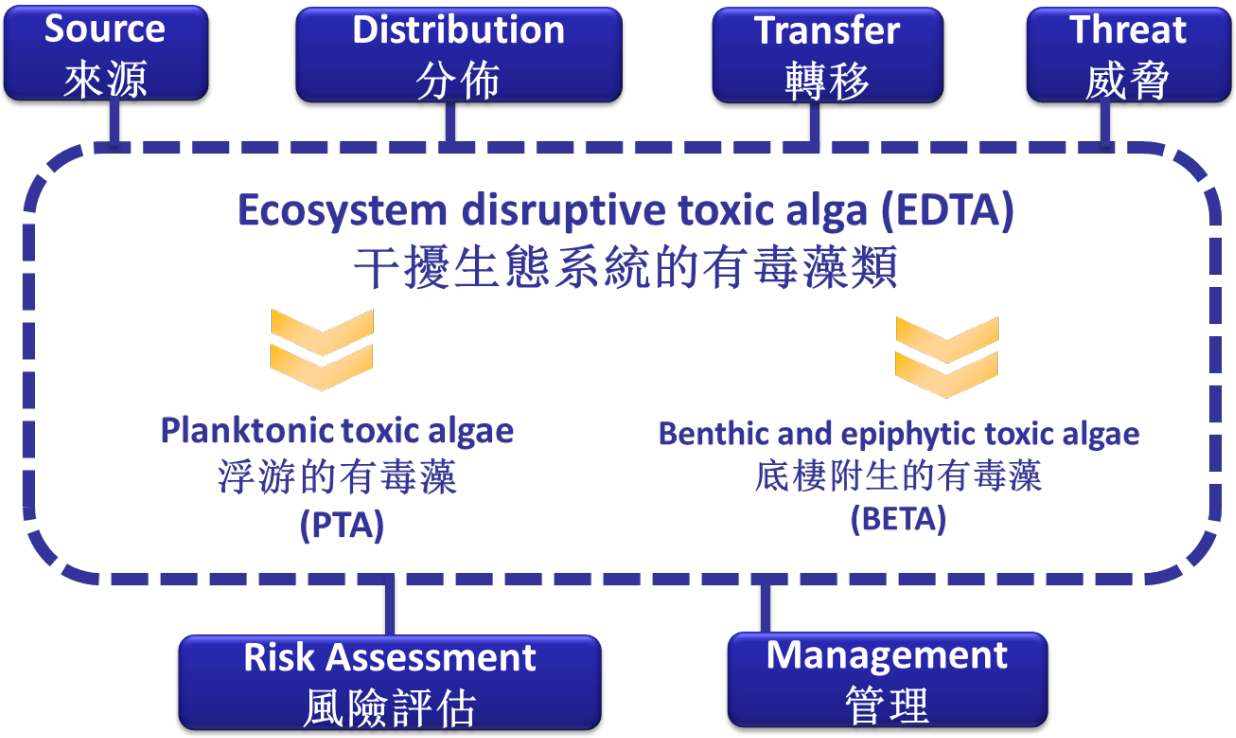
在海洋與人類健康研究中心（H2O）主任林群聲教授和常務副主任陳荔博士的帶領下，有毒藻類研究（STAR）團隊於 2013 年成立。STAR 團隊的使命是：（1）在中國以及全球海域，分離和鑑定對生態系統有破壞性的有毒藻類（EDTA）。（2）開展 EDTA 的生態學調查。（3）研究 EDTA 對人類以致生態系統健康的影響。STAR 團隊的最終目標是在行之有效的政策實施過程中，為立法者或政府提供創新的建議，以盡量減少、減輕和消除由 EDTA，尤其是底棲和附生有毒藻類（BETA）帶來的不利影響。

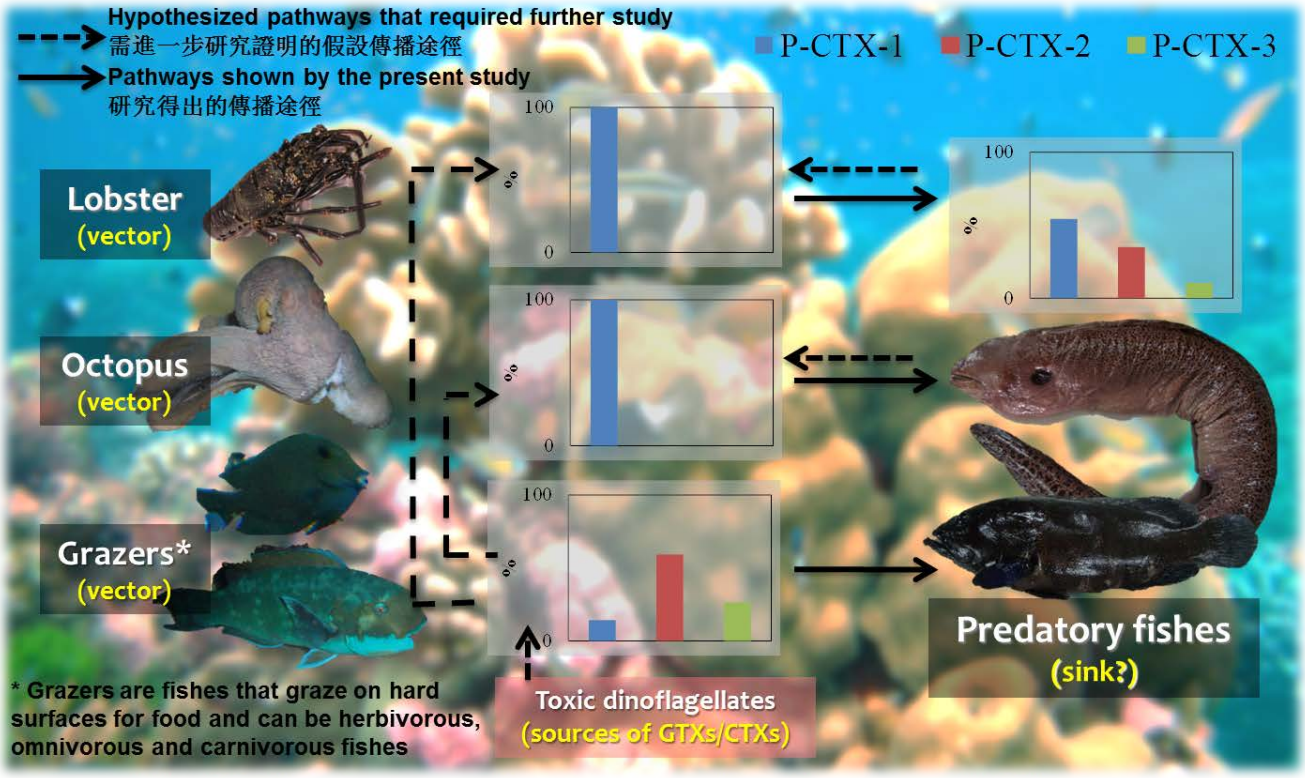
目前深圳有毒藻類研究團隊在雪卡魚中毒的研究中取得了突破性進展。在太平洋雪卡毒素（P-CTXs）提純過程中通過一個關鍵步驟實現有效純化，將以此開發定量分析方法用於雪卡毒魚的篩查。現已建立使用 LC-MS/MS 法對魚類肌肉中 P-CTXs 進行定量分析，通過進一步優化方法，魚類肌肉中 P-CTXs 的檢測精度可達到 0.5 pg/g，相比于此前公佈的方法，該數值減小了 20 倍。另外，使用魚類血液同時識別與量化 P-CTX-1、P-CTX-2 與 P-CTX-3 的方法也已經建立，該方法高效且對動物傷害小，可用於篩查活體珊瑚魚的雪卡毒性。該團隊成員已經遠赴 CFP 流行的島國，基里巴斯共和國，在太平洋中心海域開展實地研究，探討 CTXs 在珊瑚礁生態系統食物網中的傳遞，已經成功分離并鑑定了 25 株底棲甲藻，*Gambierdiscus* spp，并為如下的研究提供了寶貴的實驗材料：（1）闡明能夠促進 *Gambierdiscus* spp 生長并產 CTXs 毒素的環境因素；（2）建立、優化并驗證大規模培養的關鍵技術，以開展從產毒藻類中分離并純化 CTXs 有效標準本品的研究。根據實地觀測（包括死亡珊瑚表面的掠痕跡和從死亡珊瑚或可能的生物膜上分離 Gambierdiscus spp.）和初步的實驗結果（同位素混合模型來確定魚的食物組成，P- CTX-1 對海水青鱗（*Oryzias melastigma*）的影響，P-CTX-1 對斜帶石斑魚（*Epinephelus coioides*）肝臟細胞（GL-a）以及對斜帶石斑魚稚魚的影響），STAR 團隊計劃開展評估甲藻 *Gambierdiscus* spp.對生態系統具的破壞，即研究 CTXs 的產生，動力學以及代謝途徑，同時結合在 CFP 流行區生物多樣性的實地調查結果以及室內研究，判定 CTX 敏感魚種以及和 CTX 耐受魚種。該研究項目的發現將不僅為魚類資源的實地勘察策略指引方向，同時為政府在防控 CFP 以及減輕 Gambierdiscus spp.和 CTXs 來帶的不利影響方面提供重要數據與參考。

除此之外，STAR 團隊也致力於開發創新型化學、生物與工程領域的技術進行淡水湖泊與海洋環境中有害藻華（HABs）的早期發現、評估、預警與有效防控。其中快速激光光片顯微流式細胞術（Phytoplankton Species Identification by Fluorescence Imaging，Psi-Fi）現已被開發完成，可用於鑑定藻細胞，檢測其粒徑分佈和生物量的監測，有望實現實地且實時的藻華監控。目前該技術在太湖水域的應用與發展已經獲得江蘇省環境保護局的支持。

STAR 團隊除了由 SKLMP 成員組成，還有來自美國伍茲霍爾海洋研究所的首席科學家、國立臺灣大學漁業科學研究所、臺灣衛生福利部國家中醫藥研究所、臺灣國立成功大學生物科技研究所、法屬波里尼西亞大溪地 Louis Malardé研究所的科研人員，是一支成員國際化的研究團隊。STAR 團隊自 2012 年成立以來，通過多學科交叉合作，已從香港及中國內地不同研究領域獲得超過五百萬元港幣的研究資助。

Ecosystem disruptive toxic alga (EDTA)
干擾生態系統的有毒藻類 Prof. Paul Lam & Dr. Leo Chan





List of Grants Achieved by STAR Team
STAR 團隊獲得的資助項目

項目類型 Grant type	項目名稱 Project name
國家自然科學基金面上項目 NSFC General Program	西加毒素在海洋食物鏈傳遞之關鍵因子 Study of the Key Factors that influence the Flux of Ciguatera Toxins through Marine Food Webs
城大內部博士後基金 SKLMP Research Fellowship Program	珊瑚礁魚類對雪卡毒素的抗性和防禦機制比較研究 Comparative investigation on resistance and defense mechanism of coral reef fishes to ciguatoxins
深圳市戰略新興產業發展專項資金 Shenzhen Strategic Emerging Industry Development Special Fund	雪卡毒素高純度提取與痕量分析技術研究 Development, Optimization and Validation of Methods for Isolation, Purification and Trace Analysis of Ciguatoxins
“十二五”國家科技重大專項 National Science and Technology Major Project	水華在線檢測設備的集成與應用示範 Integrated Technology Development for Algal Bloom Online Monitoring and Validations in Lake Tai
深圳市戰略新興產業發展專項資金 Shenzhen Strategic Emerging Industry Development Special Fund	用於高產雪卡毒素的有毒綱比甲藻批量養殖技術研究 Development, optimization and validation of key techniques for mass culture of toxic *Gambierdiscus* spp. for isolation and purification of ciguatoxins
國家自然科學基金青年科學基金 NSFC Project for Young Scientists’ Fund	雪卡毒素(P-CTX-1)在小鼠體內的動態分佈及慢性毒性研究 The dynamic distribution and chronic toxicity of Pacific Ciguatoxin-1 in mice
國家自然科學基金青年科學基金 NSFC Project for Young Scientists’ Fund	雪卡毒素在珊瑚魚的轉化及累積 Biotransformation and bioaccumulation of ciguatoxins in coral reef fishes

SCIENTIFIC DIVING DEVELOPMENT

科學潛水發展

Dr. Leo Lai CHAN
陳荔 博士

Asia Pacific Underwater Scientific Technology Workshop

On 12 November 2013, a workshop on "Asia Pacific Underwater Scientific Technology" was successfully held at the City University of Hong Kong Shenzhen Research Institute. Mr. Zhang Aimin, the Deputy Director Gegneral of the Science, Technology and Innovation Commissionttee of Shenzhen Municipality; the President Mr. Shi Bo, Vice President Mr. Wen Ye and Director Mr. Dong Haifeng of Zhanjiang Diving School of the State Sport General Administration; Mrs. Zhang Xiaoshuang, the Dean of the Sports Institute, Zhanjiang Normal University; Mr. Ma Xin, the Director of Shenzhen Institute of Advanced Technology, Chinese Academy of Science; Prof. Cai Zhonghua from the Graduate School at Shenzhen, Tsinghua University; Dr. Liu Lingyan from Sun Yat-Sen University; Dr Leo Chan, Prof. Chen Ziguang and Ms. Jiang Chan from the City University of Hong Kong and others attended the workshop.

The purpose of this workshop was to discuss the significance of the development of and the prospects for scientific diving in mainland China, and how to make use of available resources the collaborating parties to build the Asia Pacific Academy of Underwater Sciences (APAUS) and the Oriental Academy of Scuba Instructors & Scientists (OASIS). The participants discussed the possibility and advantages of co-founding the APAUS and OASIS, and clear support was shown by all the attendees. Based on this support, SKLMP will build APAUS as a nonprofit academic organization.

亞太水下科學技術研討會

2013 年 11 月 12 日，亞太水下科學技術研討會在香港城市大學深圳研究院順利舉行。深圳市科技創新委員會張愛民副處長，國家體育總局湛江潛水運動學校石波校長、文野副校長、董海峰處長，湛江師範學院體育科學學院章曉霜院長，中國科學院深圳先進技術研究院科研處馬炘處長，清華大學深圳研究生院蔡中華教授，中山大學劉靈燕博士，香港城市大學陳荔博士及香港城市大學商學院陳子光教授、蔣嬋女士等人一同出席了研討會。

此次研討會目的是討論科學潛水在中國內地的發展意義、前景，以及如何充分利用各合作方所具備的資源去籌建亞太水下科學院（APAUS）與東方科學潛水學院（OASIS）。通過此次研討會的開展，全面探討了潛水行業在我國發展的重要性及其發展前景，初步明確了參會單位共同組建 APAUS 及 OASIS 的可能性及各單位所具備的優勢。

About APAUS

亞太水下科學研究院

SKLMP 為團結有意發展水下科學的科學家們，擬籌建亞太水下科學研究院（Asia Pacific Academy of Underwater Sciences, APAUS）。本機構是非營利性的學術組織，籌建議案已獲得了北京大學、清華大學、廈門大學、深圳大學、中山大學、中國科學院三亞深海科學與工程研究所等院校老師們的支持。

宗旨

旨在通過研究和開發水下儀器、裝備以及開展水下安全培訓，提高水下科學研究、海洋探測以及水下探險的能力，為海洋科學研究、技術開發和水下安全服務，促進環南海水下科學的發展。

使命與願景

1. 通過水下科學研究與技術開發，增加人類對海洋的認識，通過提供探索海洋的新技術、新途徑和新方法，以滿足複雜海洋環境的各種需求；
2. 以水下科學研究需求帶動水下技術的發展，加強科學家與工程師之間的聯繫，結合二者的力量共同設計、建造、使用創新儀器和系統；
3. 通過亞太地區科學和技術人員的緊密合作，促進和提高亞太地區水下安全和水下探測技術水準，為海洋生態普查、海洋探險和水下安全服務。

The proposal has also been supported by professors or scientists of Peking University, Tsinghua University, Xiamen University, Shenzhen University, Sun Yat-Sen University and Sanya Institute of Deep-sea Science and Engineering, Chinese Academy of Sciences.

Purpose

Through studying and developing underwater instruments and equipment, as well as carrying out underwater security training, APAUS aims to improve underwater scientific research, underwater detection and underwater exploration for the benefit of marine scientific research, technological development and underwater security services and promote the development of underwater science in the South China Sea.

Mission and Vision

1. To increase human understanding of the complexity of the marine environment by developing novel underwater scientific research methods and technology;
2. To meet the technological demands of underwater scientific research by strengthening partnerships among scientists and engineers who design, build and use novel instruments and systems;
3. To promote underwater detection technology in the Asia-Pacific region to improve marine ecological surveys, ocean exploration and underwater security in the area.

Conservation of Horseshoe Crabs
馬蹄蟹保育

The field release of juvenile horseshoe crabs from secondary school students at Shui Hau, Lantau Island as part of the conservation activities, July 2013 (photo credit: OPCFHK)

Dr. Paul Kam Shing SHIN
單錦城 博士

As Co-Chair of the IUCN (International Union for Conservation of Nature) Species Survival Commission Horseshoe Crab Specialist Group, I have been working with Dr. SG Cheung of the SKLMP in promoting the conservation of horseshoe crabs in Hong Kong, as well as internationally. Horseshoe crabs are regarded as living fossils, with ancestors dated back to 475 million years ago. To-date, only 4 species exist in the world and among them, 2 species are found in Hong Kong. Coastal developments, destruction of spawning and nursery shores and other human activities have led to a sharp decline of local juvenile horseshoe crab populations. Apart from our continuing, collaborative programme with Ocean Park Conservation Foundation in conducting a "School rearing programme on juvenile horseshoe crabs" with secondary schools, we have held the first tripartite sharing of conservation experience among students from mainland China, Taiwan and Hong Kong, and a Horseshoe Crab Fortnight Exhibition at the Hong Kong Wetland Park in August 2013, in which the public can learn about the crabs' eating, moulting and mating behaviour as well as hear about conservation tips through an array of activities such as horseshoe crab face-painting, an origami cum badge workshop, and a public lecture titled "Thinking of the Past: Horseshoe Crabs in Hong Kong". In Nove mber 2013, we also held a special session on "Comparative Approaches to Horseshoe Crab Ecology and Conservation in North America and Southeast Asia" at the 22nd Biennial Conference of the Coastal and Estuarine Federation in San Diego, California, USA.

作為國際自然保護聯盟物種生存委員會馬蹄蟹專家小組的聯席主席，我一直在努力與 SKLMP 的張肇堅博士共同推動香港與國際的馬蹄蟹保育工作。馬蹄蟹被視為活化石，其祖先可追溯到 4.75 億年前。截至目前，世界上只存在 4 種馬蹄蟹，其中，香港可見 2 種。沿海的開發，破壞了馬蹄蟹用於產卵與孵化的溫床，並且其他一些人類活動也導致了本地幼體馬蹄蟹數量的銳減。

除了我們與海洋公園保育基金合作在中學持續開展的「馬蹄蟹校園保母計劃」外，我們於 2013 年 8 月，也在香港濕地公園進行馬蹄蟹雙週展，在來自中國大陸，台灣和香港學生之間首次分享三方的保育經驗，使公眾可瞭解到螃蟹的進食，蛻皮，交配行為。並且通過一系列的活動，如馬蹄蟹臉畫，摺紙暨徽章工坊和一場題為「思考過去：香港的馬蹄蟹」的公開講座， 使公眾瞭解其保育方法。 2013 年 11 月，在美國加利福尼亞州聖達戈舉辦的第 22 屆海岸與河口研究聯合會雙年會議上，我們還舉行了「馬蹄蟹在北美和東南亞的生態與保護比較」的特別會議。

& Dr. Siu Gin Cheung

張肇堅 博士

Mainland China - Taiwan - Hong Kong tripartite student video conference on horseshoe crab conservation at Hong Kong Wetland Park on 10 August 2013

Novel Bioanalytical Techniques and Biomimetic and Biofunctional Materials

新型生物分析技術及仿生和生物功能材料

Prof. Michael Meng Su YANG

楊夢甦 教授

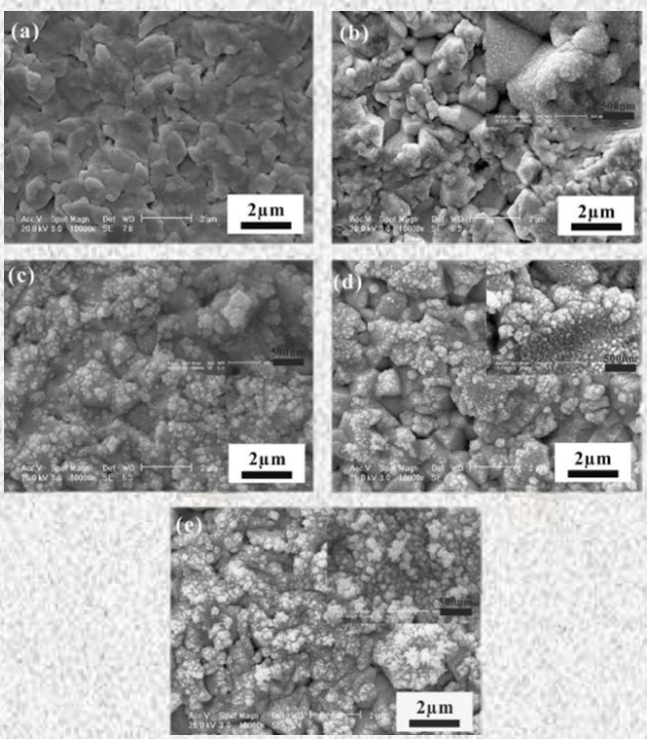


Figure 1: Scanning electron microscope (SEM) images of bare electrode (a) and Au NPs modified electrodes (b-e). The inserts in (b-e) are the enlarged image of modified electrodes.

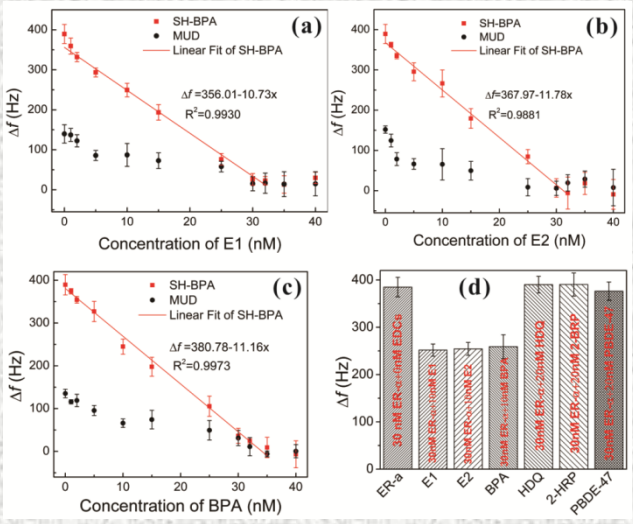


Figure 3: Competitive binding assay for E1 (a), E2 (b) and BPA (c) detection. (d) The specificity of the biosensor was verified by the response to three non-specific environmental pollutants (HDQ, 2-BRP and PBDE-47)

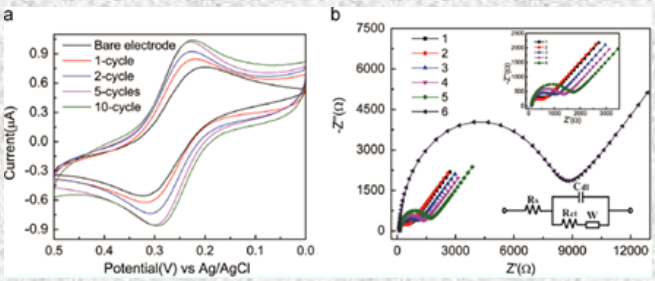


Figure 2: Cyclic voltammetric profiles acquired from the bare electrode and modified electrodes (1-, 2-, 5- and 10-cycle) in 1M KCl solution containing 1 mM $K_3[Fe(CN)_6]$ at a scan rate of 100 mV/s. (b) Nyquist diagram of EIS recorded from 100 kHz and 100 mHz for $[Fe(CN)_6]^{3-}/[Fe(CN)_6]^{4-}$ (5 mM, 1:1) in 1.0 M KCl at bare electrode (curve 1), Au NPs modified electrode (curve 2), SAM (MCH/MUD, curve 3; MCH/SH-BPA, curve 4) coated electrodes, ER-α bound electrodes (bound to the MCH/MUD, curve 5; bound to the MCH/SH-BPA, curve 6). The insert represents the Randles equivalent circuit model.

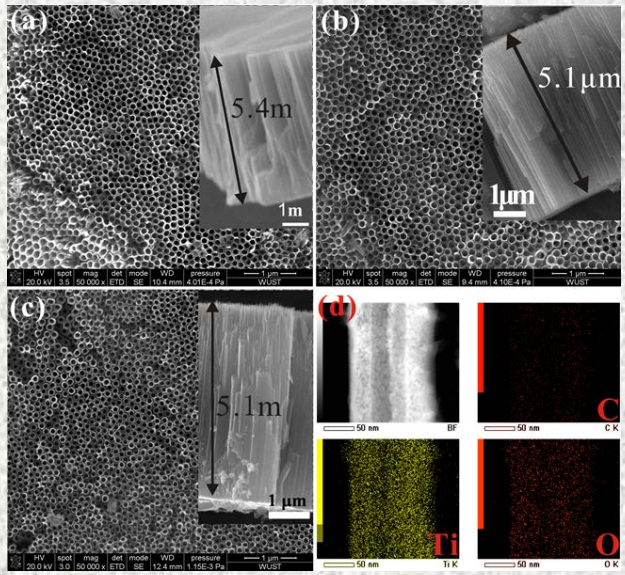


Figure 4: (a, b, c) SEM images of the top-surface and cross-section (inset) morphology of as-anodized NTAs, TiO_2-NTAs/air and TiO_2-NTAs/Ar, (d) spatially resolved EDS elemental maps depicting the distribution of the constituting elements within the TiO_2-NTAs/Ar.

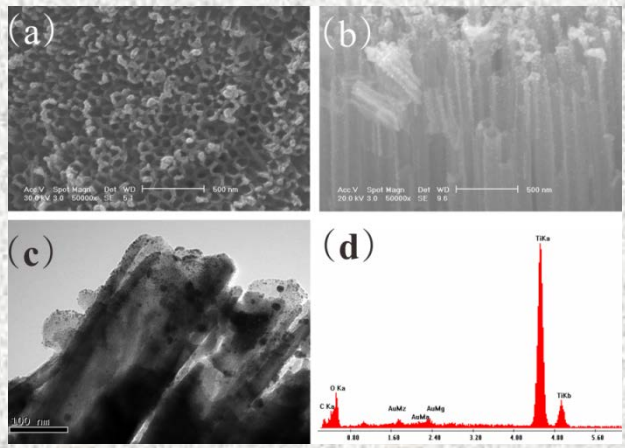


Figure 5: (a) and (b) SEM images of the top-surface and cross-section morphology of Au modified C-doped TiO_2-NTAs, (c) and (d) TEM image and EDX of Au modified C-doped TiO_2-NTAs, respectively.

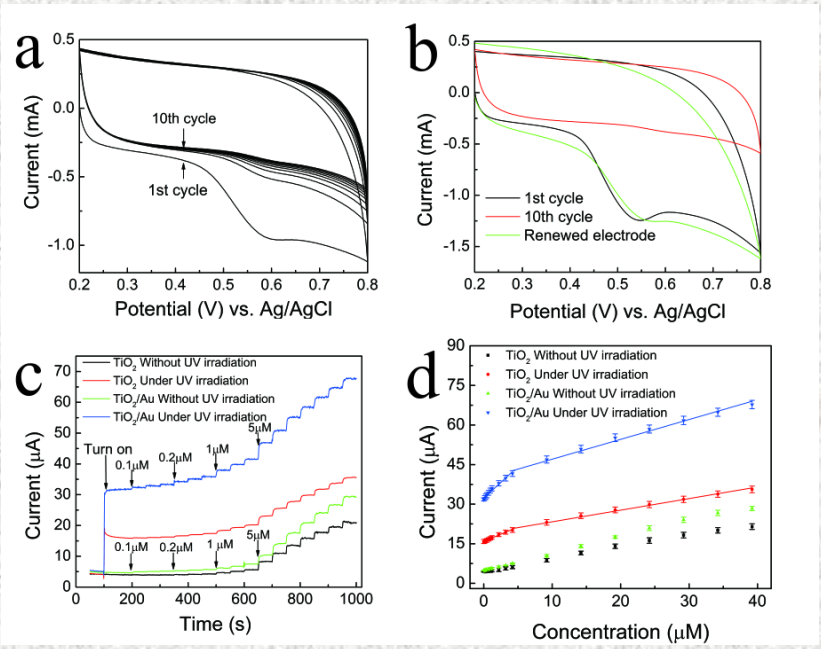


Figure 6: Cyclic voltammetric profiles of 0.1 mM BPA in a 0.1 M pH = 7.4 PBS successive scan for 10 cycles obtained from original (a) and renewed (red, b) Au modified C-doped TiO_2-NTAs electrode. Scan rate: 100 mV/s. (c) Typical current-time response curves of the without and with Au modified C-doped TiO_2-NTAs electrodes through successive addition of different concentrations of BPA (0.1-40 μM) into a stirred 0.1 M PBS (pH = 7.4) at an applied potential of 580 mV with/without UV irradiation, respectively. (d) The calibration curve of the respond currents versus concentrations of BPA with/without UV irradiation. The error bars represent the respond current of three independent experiments.

BROMINATED FLAME RETARDANTS EXPOSURE OF RESIDENTS IN PEARL RIVER DELTA

珠三角母體及新生兒組織樣品中多溴聯苯（PBDEs）的分佈

Prof. Ming Hung Wong

黃銘洪 教授

The concentrations of polybrominateddiphenyl ethers (PBDEs) and their analogues such as methoxylated (MeO-) and hydroxylated (OH-) PBDEs in humans have been increased in recent years. Rodent studies indicate that PBDEs may be detrimental to neurodevelopment, possibly by lowering thyroid hormone concentrations in blood. Human exposure assessments have indicated newborns as particularly vulnerable for chemical exposure. The Pearl River Delta (PRD) is a global power house producing a large amount of electronic products.

Previous studies indicated that high levels of PBDEs are accumulated in the blood plasma from the PRD. Therefore there is an urgent need to study the levels of accumulation and extent of maternal transfer of PBDEs in newborns from this area.

The major aim of this project is to determine the levels of PBDEs in human milk, placenta, neonatal serum and urine and then to evaluate the extent of maternal transfer and the related health risks of PBDEs to newborns in the PRD.

近年來環境及人體中的多溴聯苯醚(polybrominateddiphenyl ethers，PBDEs)和其他一些新型阻燃劑如甲氧基及羥基多溴聯苯醚引起了越來越多的關注。研究表明BPDEs在體內的蓄積將影響神經發育及血液中甲狀腺激素的分泌，從而對胎兒的生長發育造成嚴重的影響。珠江三角洲地區作為重要的製造業基地生產了大量的電子產品,PBDE污染問題對本地區而言尤其重要。

前期研究表明珠三角人體血液樣本中 PBDEs 的濃度較高。從而母嬰之間的 PBDEs 傳遞及其在新生兒人體當中的蓄積極待研究。

本研究的主要目的在於測定母體乳汁、血液及新生兒血液、尿液中的 PBDEs 蓄積情況，從而評價 PBDEs 的母嬰傳遞及其對新生兒可能造成的影響。

Sampling

Thirty sets of human samples [(1) human milk, (2) blood, (3) placenta, (4) urine] were collected from major five cities (Guang zhou, Dong guan, Fo shan, Zhu hai, and Zhon shan) in the PRD through the Ethics Committee.

採樣

30 套人體樣本（包括母血、乳汁、新生兒血液及尿液）分別取自珠三角的五個主要城市：廣州、東莞、佛山、中山、珠海。

Main analytical processes of human samples

人體樣本的 PBDEs 測定

Extraction 提取

Purification 純化

Instrumental analysis
儀器分析

Result

The concentrations of total PBDEs found in placenta ranged from 1.56 to 110 ng/g lipid, neonatal serum samples ranged from 14 to 260 ng/g lipid, human milk ranged from 1.92 to 58.9 ng/g lipid, and neonatal urine ranged from 3.56 to 113 ng/g lipid, respectively.

結果

PBDE 的濃度在胎盤中為 1.56 to 110 ng/g lipid，新生兒血液中為 14 to 260 ng/g lipid，母乳中為 1.92 to 58.9 ng/g lipid，新生兒尿液中為 3.56 to 113 ng/g lipid。

Discussion

Individual neonatal serum and urine concentrations did not differ from the corresponding maternal concentrations in both placenta and milk, indicating that measurement of maternal PBDE placenta and milk levels is useful in predicting fetal exposure. In accord with reports on other biologic samples, BDE-47 and BDE-99 were the dominant congeners of total PBDE in human milk, placenta, neonatal serum and urine. The concentrations of PBDEs found in the present study were compare with other studies in which samples were collected from China and other Asian countries, but lower than other developed countries such as the USA and United Kingdoms. Our study shows that human fetuses in the PRD may be exposed to moderate levels of PBDEs. Further investigation is required to determine if these levels are specific to the South China and to assess the toxic potential of these exposure levels.

討論

新生兒血液及尿液中的 PBDE 濃度與其對應的母體胎盤及乳汁中的濃度呈統計學（$p<0.05$）正相關，從而表明可以通過監測母體胎盤或乳汁中的濃度從而預測新生兒暴露於 PBDE 的情況。與以往研究類似，BDE-47 和 BDE-99 是母嬰組織樣本中 PBDE 的主要同系物。結果表明珠三角人體樣本中 PBDE 的濃度于我國其餘地方及亞洲其餘國家報導的濃度相近，但顯著低於發達國家如美國、英國等的濃度。研究發現珠三角的新生兒暴露於中等濃度的 PBDE 水準。其對胎兒發育和新生兒健康的影響有待進一步研究。

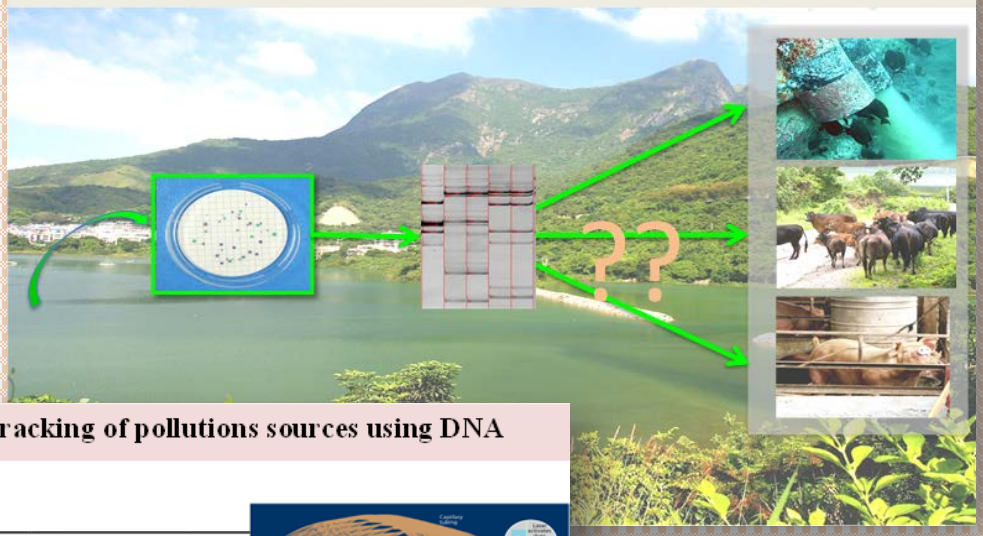
Innovative Fecal Pollution Monitoring

Fecal pollution of water resources is an environmental problem as old as the human civilization. For many decades, governments around the world have been relying on a small of fecal bacteria, such Escherichia coli and Enterococcus spp., as pollution indicators. However, emerging evidence suggests that such strategy suffers from a number of limitations and biases that preclude accurate, efficient and timely detection of pollution events. Stanley Lau's current research aims at innovating the water pollution monitoring technology through basic understanding of the genetic diversity and behavior of fecal bacteria in aquatic environments.

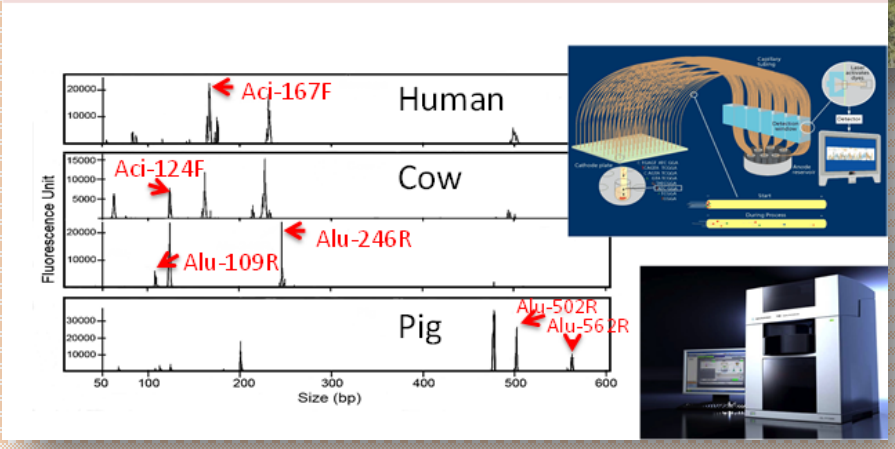
Besides basic research, Stanley Lau has been serving various government departments in Hong Kong on projects related to water quality monitoring. He also serves on the WWF-Hong Kong Mai Po Management Committee.

Dr. Stanley C.K. LAU
劉振鈞 博士

Identify source of fecal pollution using DNA fingerprints of enteric bacteria



High throughput tracking of pollutions sources using DNA

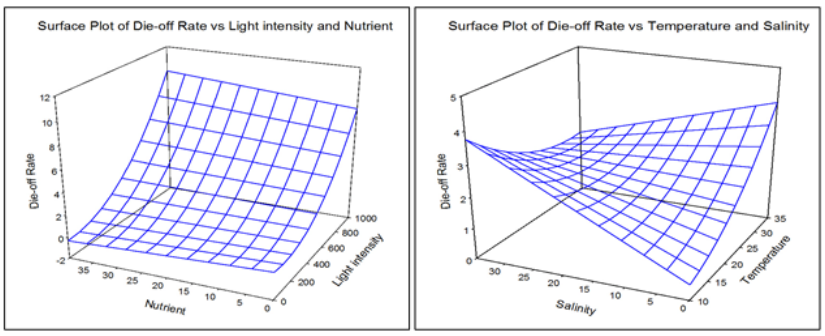


排泄物污染監測新技術

水資源的糞便污染是一個類似人類文明一樣古老的環境問題。幾十年來，世界各國政府一直依靠的少數糞便細菌，如大腸桿菌和腸球菌，作為污染指示物。然而，新的證據表明，這樣的做法存在諸多局限和誤差，導致無法對污染事件進行準確、有效且實時的監控。劉振鈞博士目前的研究旨在通過對一水環境中糞便細菌遺傳多樣性和行為的基本認識，開發水體污染監測新技術。

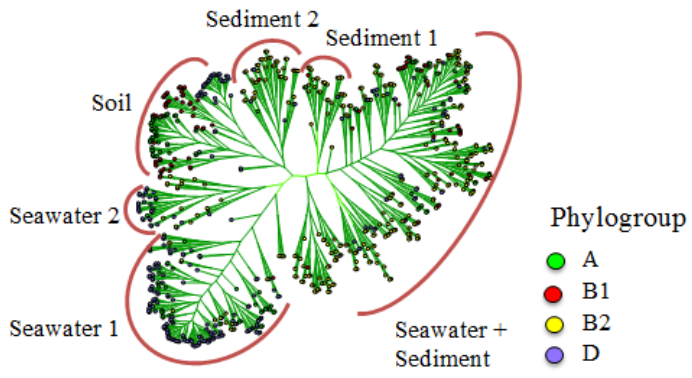
除基礎研究之外，劉振鈞博士已在有關水質監測的項目中為多個政府部門提供服務。目前他還任職于世界自然基金會香港米埔管理委員會。

Improving health risk assessment through the understanding of pathogens' response to environmental stresses



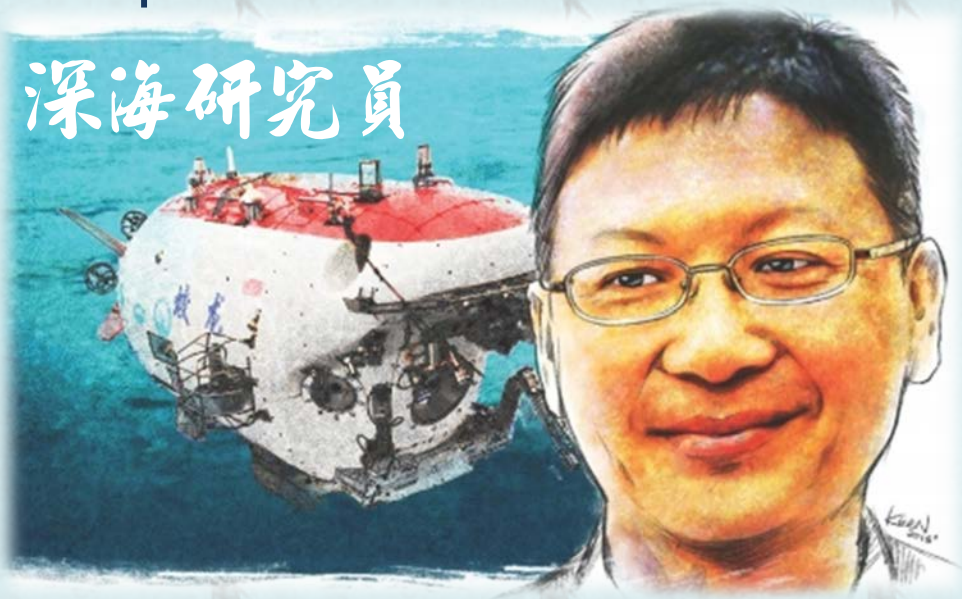
Die-off response of *Enterococcus* spp. in seawater

Improving health risk assessment through the understanding of the ecology of enteric bacteria in the natural environment



Each environment enriches for a different diversity of *E. coli*

Deep-Sea Researcher



Media exposure: My dive with the Jiaolong submersible into South China Sea (June 10 –July 12) has been widely reported by media. A press conference was held by HKBU's PR Office on July 19, which attracted the attendance of thirty local media, and the news was reported in virtually all local major news media (TV and newspapers). A follow-up profile of my research in marine biology was published by South China Morning Post on August 5 with the title "Deep-sea researcher lives the life aquatic" (reporter Jolie Ho, illustrator Lau Ka-kuen).

媒體報導：我隨蛟龍號潛入中國南海（6 月 10 日至 7 月 12 日）已被媒體廣泛報導。7 月 19 日香港浸會大學的公共關係辦公室舉行了一場新聞發布會，吸引了三十個當地媒體出席，該新聞幾乎報導在所有地方主要新聞媒體（電視，報紙）中。關於我所研究的海洋生物的後續資料被南華早報於 8 月 5 日以「科學家深海探秘」為標題進行了報導（記者 Jolie Ho，插畫 Lau Ka-kuen）。

Dr. Jian Wen QIU
邱健文 博士

http://www.scmp.com/news/hong-kong/article/1294304/deep-sea-researcher-lives-life-aquatic

Shenzhen Marine Industrial Development Plan (2013-2020)

深圳市海洋產業發展規劃（2013-2020）

SKLMP 夥同深圳海洋研究與技術聯盟各成員單位，在深圳市人民政府關於《深圳市海洋產業發展規劃（2013—2020 年）》（深府〔2013〕112 號）的制定工作中，發揮著了舉足輕重的作用。SKLMP 與其內地分支機構——海洋與人類健康研究中心這種深港緊密聯繫的工作模式受到了深圳市政府的認同，從政策的制定層面引導深港兩地在海洋方面的深度合作。

SKLMP and other members of the Shenzhen Marine Research and Technology Consortium played an important role in formulating the Shenzhen Marine Industry Development Plan (2013-2020). The work of SKLMP and its division in mainland China, Research Centre for the Oceans and Human Health recognized by the Shenzhen Municipal Government, so that the government has established the policy to guide the deep collaboration between Shenzhen and Hong Kong in the field of marine.

深圳市人民政府文件

深府〔2013〕112 号

深圳市人民政府关于印发深圳市海洋产业发展规划（2013—2020 年）的通知

各区人民政府，市政府直属各单位：

现将《深圳市海洋产业发展规划（2013—2020 年）》印发给你们，请遵照执行。

深圳市人民政府

2013 年 11 月 29 日

文件部分內容摘抄：

“ *深港合作。加強與香港高校、研發機構合作，在河套地區與香港合作發展海洋科技研發專案，促進深港海洋科技交流與合作；推動深港共建海洋產業創新基地、人才培訓與交流平臺，規劃建設香港城大（深圳）海洋產業研究中心。* ”

“ *把深港海洋合作作為深港合作的重要內容，充分利用香港在海洋資源管理和海洋科研方面的領先優勢，拓寬合作領域，共同建設深港海洋大都會。* ”

“ *由深圳大學、清華大學研究生院、北京大學研究生院、中科院深圳先進技術研究院、香港城市大學、廈門大學、中山大學、中南大學等研究機構和涉海企業、協會發起成立“深圳市海洋產業發展產學研聯盟”，各方出資成立海洋技術與產業孵化中心，開展科研成果的轉移轉化。* ”

Academic Exchange and Collaborations
學術交流與合作

4th MAR

On 4 March, Dr. Leo Lai Chan together with other team members visited Shenzhen Sevenstar Yacht Club and Shenzhen Puerto Galera Diving Center in the company of Mr. Huang Yishao, the secretary-general of Shenzhen Yachting Association. The aim of this visit was to develop the Spin Kid Project in Shenzhen, and to conduct an inspection of local diving infrastructure, environment, etc. Tourism in Shenzhen's eastern coastal region is at its preliminary stage, and an ocean culture industry has not yet been developed, but the local sea, blue sky and marine environment are good. Through the vigorous promotion of ocean culture and the introduction of an advanced enterprise management model and experience, this will greatly facilitate tourism in Mirs Bay.

3 月 4 日，陳荔研究員等人在深圳市帆船帆板運動協會秘書長黃儀紹的陪同下，參觀深圳大鵬灣桔釣沙的七星灣遊艇會和楊梅坑的海豚灣潛水中心。此行是勘察當地潛水的基礎設施、環境等，以便為在深圳開展“哪吒計劃”做準備。深圳東部的高端濱海旅遊剛處於起步階段，海洋文化產業尚未開發，但當地碧海藍天、海洋環境較好，通過大力推廣海洋文化，以及引入先進的企業管理模式與經驗，將對大鵬灣的旅遊業有極大的促進。

17th MAR

On 17 March, CityU's Vice President Prof. Paul Kwan-sing Lam (SKLMP and H2O Director) and Prof. Xue Quan and other professors welcomed Vice President Prof. Huang Zhen from Shanghai Jiao Tong University. The visit assisted both universities in gaining a deeper understanding of each other and relevant marine research. Through cooperation the SKLMP and Shanghai Jiao Tong University have complementary advantages. In addition to this, Shanghai Jiao Tong University has set up an institute in Shenzhen, and it will most likely join the Shenzhen Marine Research and Technology Consortium. The two universities will continue to increase cooperation and academic exchange with each other in order to serve National Oceanic Development.

3 月 17 日，上海交通大學副校長黃震教授一行人等到香港城市大學深圳研究院進行交流訪問。我方香港城市大學副校長（海洋與人類健康研究中心主任）林群聲教授、香港城市大學協理副校長薛泉教授等人接待了來訪人員。此次交流，深化了兩校之間的認識，加強了在海洋研究方面的瞭解。香港城市大學海洋污染國家重點實驗室在海洋污染與海洋生物方面具有優勢，可通過與上海交大的合作進行優勢互補。另外，上海交通大學在深圳也成立了深圳研究院。今後將非常可能加入深圳海洋研究與技術聯盟，共同在聯盟平臺上為國家海洋事業服務。

3rd APR

On 3 April, Prof. Paul Kwan-sing Lam together with seven team members attended an academic exchange with Prof. Ma Hui and Prof. Cai Zhonghua at the Graduate School at Shenzhen, Tsinghua University. The meeting was aimed at developing cooperation to meet the ASEAN's marine science strategic development needs.

4 月 3 日，林群聲教授帶領團隊成員一行七人到清華大學深圳研究生院，與清華大學深圳研究生院馬輝副院長及蔡中華教授等人召開了學術合作和項目進展的交流會。會議主要圍繞國家針對東盟十國的海洋科學戰略發展探討雙方潛在的合作性。

22nd APR

On 22 April, Dr. Leo Lai Chan and his seven team members went to Peking University Shenzhen Graduate School and attending a Marine Resources Development and Utilization Technology seminar. Prof. Luan Shengji and his team members as well as Prof. Cai Zhonghua from Tsinghua University attended the meeting. About half the participants were SMART members, and the meeting was aimed at understanding each other's research interests and advantages in order to promote multilateral cooperation.

4 月 22 日，陳荔博士帶領實驗室 7 名同事到北京大學深圳研究生院參與海洋資源開發及其利用技術研討會。北京大學深圳研究生院副院長欒勝基教授及其團隊成員，以及清華大學深圳研究生院蔡中華教授一同出席了研討會。此次參會人員中近一半是 SMART 的成員，會議目的是梳理 SMART 成員單位的內部資源以及瞭解各方優勢與研究方向，以便於促進多方合作。

17th MAY

On 17 May, invited by Mr. Zheng Zhiwen, the Director of Shenzhen Marine Environment and Resources Monitoring Center, Dr. Leo Lai Chan together with Dr. James Chung-wah Lam, Dr. Maggie Yim-ling Mak and others (a total of seven key members) visited the center. Cooperation regarding marine resources protection and technology was discussed. This exchange revealed that both teams were interested in nuclear radiation monitoring, early warning on red tides, marine biodiversity surveys and regular exchanges between the two teams. They agreed to promote marine science research in Hong Kong and Shenzhen together in order to make Shenzhen and Hong Kong an important marine science research center of south China.

5 月 17 日，在深圳市海洋環境與資源監測中心鄭志文主任的邀請下，陳荔博士攜我室骨幹成員林忠華博士、麥豔玲博士等一行七人，前往深圳市海洋環境與資源監測中心參觀考察。雙方就海洋資源保護及技術合作進行了交流探討。通過此次交流，雙方就核放射監測，赤潮預警追蹤、生物多樣性調查、團隊之間定期開展交流活動等具體事宜進行了深入探討，雙方希望整合優勢資源，共同推進深圳和香港的海洋科學研究，使深圳及香港成為中國南方海洋科學的重要研究中心。

2nd JUL

On 2 July, undergraduate, postgraduate students and research staff from the SKLMP joined a research cruise conducted in Japan and had discussions with researchers from the National Institute of Advanced Industrial Science and Technology (AIST) about future research collaboration on contaminants of emerging concern.

7 月 2 日，我室研究人員和本科生、研究生代表一行赴日本參加學術交流，並與來自日本產業技術綜合研究所的科研人員就今後雙方在新興污染物方面的合作問題進行了深入探討。

5th AUG

From the period of 5-19 August, Associate Director Dr. Leo L. Chan and Dr. Maggie Y.L. Mak from the SKLMP, together with Prof. Cai from the Tsinghua University Graduate School at Shenzhen and Mr. Zhang Aimen from the Science Technology and Innovation Commission of Shenzhen Municipality, went to the U.S. to visit and meet scholars from five world-class universities and research institutes in order to explore the development and application of advanced underwater instruments in marine environmental research. With the guidance of the well-developed scientific diving framework established by the American Academy of Underwater Science (AAUS) in the U.S., the visit facilitated the development of the Asia-Pacific Academy of Underwater Science (APAUS) in Hong Kong, Taiwan and the Mainland China. The purpose of this Academy is to safeguard scientists who carry out marine environmental research based on scuba diving by the establishment of safety manuals, protocols and management systems for scientific diving.

8 月 5 日至 19 日，海洋污染國家重點實驗室副主任陳荔博士與麥艷玲博士、清華大學深圳研究生院蔡中華教授和深圳市科技創新委員會張愛民副處長到美國參觀了五所世界頂尖大學及研究所並與各學者會面。這次訪問考察了可作海洋環境研究的先進水下儀器。 隨著美國水下科學學院（AAUS）在美國建立的成熟科學潛水框架，此訪問將促進亞太水下科學學院（APAUS）在香港，臺灣和中國內地的發展，從制定科學潛水的安全手冊，程序以及管理體系以保障科學家以水肺潛水進行海洋科學研究的生命安全。

2nd SEP

From 2-6 September, Associate Director Dr Leo L. Chan and Dr. Maggie Y.L. Mak from the SKLMP have been to Taiwan to visit and meet Prof Hong-Nong Chou (the Institute of Fisheries Science, National Taiwan University), Dr Chung-Kuang Lu (the National Research Institute of Chinese Medicine, Ministry of Health and Welfare), Dr Yi-min Chen (the Institute of Biotechnology, National Cheng Kung University), Prof. Arthur C.T. Chen (the Department of Oceanography, National Sun Yat-sen University), Prof. Keryea Soong (the Institute of Marine Biology, National Sun Yat-sen University) and Prof. Yeng Su (National Penghu University of Science and Technology). This visit aimed to explore state-of-the-art techniques for mass culture of both pelagic and benthic dinoflagellates, the establishment of an algal resource center which may facilitate the identification of valuable algal species (e.g. natural bioactive compounds, algae with high nutritional value, etc) and their subsequent commercialization, as well as advanced techniques for aquaculture (e.g. the application of oral/injected fish vaccines, import of fry, etc). The Institute of Marine Biology, National Sun Yat-sen University has developed scientific scuba diving protocols to conduct sub-tidal surveys. The visit provided valuable exchange of ideas for the establishment of the Asia-Pacific Academy of Underwater Science (APAUS).

8 月 5 日至 19 日, 海洋污染國家重點實驗室副主任陳荔博士與麥艷玲博士到臺灣訪問了周宏農教授 (國立台灣大學漁業科學研究所)、盧重光博士 (衛生福利部國家中醫藥研究所)、陳逸民博士 (國立成功大學生物科技研究所)、陳鎮東教授 (國立中山大學海洋科學系)、宋克義教授 (國立中山大學海洋生物研究所)及蘇焉博士 (國立澎湖科技大學)。此次訪問旨在探討最先進技術以大規模培養浮游和底棲甲藻、藻類資源中心的建立(以促進珍貴藻種的鑒定、天然生物活性化合物和具高營養價值藻種的篩選及其商業化)及水產養殖先進技術(口服/注射疫苗，魚苗)的引進。國立中山大學海洋生物研究所已經開發科學潛水進行亞潮帶研究，這次訪問為建立亞太研究院水下科學（APAUS）提供了寶貴的思路交流。

23rd OCT

On 23-25 October, Prof. Paul K.S. Lam, Dr. James C.W. Lam and Dr. Tak-cheung Wai attended a Marine Environmental and Biological Symposium, at National Museum of Natural Science, Taichung, Taiwan. They had a kick-off meeting with the collaborators of a GRF project “Population trends, food sources, habitat use, and trace element exposure of marine mammals in Pearl River Delta: using teeth as biological time capsules for tracing environmental changes”. During the meeting Dr. Chiou-Ju Yao (one of the co-investigator of the project; host of the meeting) and her colleagues had kindly arranged a mammal tooth-sectioning demonstration."

10 月 23 至 25 日，林群聲教授連同林忠華博士及韋德祥博士出席了在臺灣臺中國立自然科學博物館的海洋環境及生物學專題研討會。他們與 GRF 計劃「珠江三角洲海洋哺乳動物種群趨勢、食物源、棲息地利用與微量元素暴露量：利用牙齒作為生物時間囊以追蹤與檢測環境變化」的合作者們進行了啟動會議。在會議期間姚秋如博士（該項目的合作研究者之一，會議主持人）以及她的同事們還為大家精心安排了哺乳動物牙齒切片的展示。

16th DEC

On 16 December, Dr. Leo Chan together with Dr. Maggie Mak and Dr. Jiajun Wu attended the International Workshop of Harmful Algae Blooms and Eutrophication at Zhejiang University. The seminar invited many local and international experts and scholars on HABs in different ecosystems to share their latest academic achievements and new research advances, comparing the key species involved and the oceanographic processes that influence their population dynamics. The three participants from SKLMP all made reports during the workshop and had further communication and discussion with other experts, laying a good foundation for future our cooperation.

12 月 16 日，陳荔博士帶領麥豔玲博士、吳佳俊博士一行三人受邀參加由浙江大學海洋學院主辦的「有害赤潮與富營養化國際研討會」。此次會議邀請到海洋赤潮研究領域的國內外眾多專家學者共同探討赤潮研究最前沿科技和方法，比較關鍵赤潮生物和海洋過程之間的相互作用。我室三名與會人員分別做了相關專題報告，與專家們進行了深入的交流和探討，為增強我室與世界知名赤潮研究專家和團隊之間開展進一步合作打下了堅實基礎。

2013 Delegations received 訪客

23 Jan	Shanghai Lingang Marine Science Park 上海浦東臨港海洋高新區 Far Eastern Federal University 遠東聯邦大學
1 Mar	Graduate School at Shenzhen, Tsinghua University 清華大學深圳研究生院 Hong Kong Baptist University 香港浸會大學 Xiamen University 廈門大學 The Personnel Department of Ministry of Education 教育部人事司 Sichuan University 四川大學
17 Mar	Shanghai Jiao Tong University 上海交通大學
13 May	Zhongshan Science and Technology Bureau 中山市科技局
29 May	Administrative Committee of Qingdao Blue Valley Core Area 青島藍色矽谷核心區管理委員會
28 Jun	ZTE Instruments (Shenzhen) Co., LTD 中興儀器（深圳）有限公司
11 Jul	CSE Students Laboratory CSE 學生實驗室
18 Jul	Guangdong Experimental High School 廣東實驗中學 The Affiliated High School of South China Normal University 華南師範大學附屬中學
23 Jul	Beijing University of Aeronautics and Astronautics 北京航空航天大學
10 Sep	Nu Skin Enterprises 如新集團

Visiting Scholars in 2013
2013 年的到訪學者

Dr. Hua KUANG 匡華 博士 (Jiangnan University 江南大學)

Dr Kuang's research at CityU focused on antigen and antibody preparation for ciguatoxins which could be used in ciguatoxin enrichment. Dr Kuang's research area is food safety and analysis. She continued to work on ciguatoxin antigen synthesis and monoclonal antibody screening after returning to Jiangnan University. With the development of specific affinity molecules, various immunoassays will be developed for ciguatoxin determination in seafood.

匡華博士主要進行雪卡毒素的抗原合抗體的製備工作，以用於石斑魚中雪卡毒素的富集和檢測。期滿結束，匡華博士回到江南大學繼續進行雪卡毒素及其類似物抗原的製備以及單克隆抗體的篩選工作，開發雪卡毒素及相關毒素的快速免疫檢測方法。

Dr. Bokun LIN 林伯坤 博士 (Shantou University 汕頭大學)

As an essential part of the cooperative project entitled 'Marine Environmental Monitoring Programme for the Remediation and Development Project at the Estuary Area in the Eastern District of Shantou' launched by Shantou University (STU) and the Research Centre for the Oceans and Human Health (H2O), Shenzhen Research Institute of City University of Hong Kong, Dr. Bokun LIN paid a one-year visit) to City University of Hong Kong to conduct collaborative research.

作為汕頭大學與香港城市大學深圳研究院海洋與人類健康研究中心共同承擔的合作研究項目「汕頭市東部城市經濟帶河口治理及綜合開發項目施工期海洋環境跟蹤監測」的一部分內容，林博士作為訪問學者來香港城市大學進行為期一年的合作研究工作。

Dr. Min LIU 劉敏 博士 (Xiamen University 廈門大學)

In 2013, Dr. Liu took part in the project "Fish resources study for the proposed marine park in the Brothers Islands".

2013 年，劉博士參與了「香港大小磨刀島嶼海岸公園（規劃中）的魚類資源調查」項目。

Dr. Zhiguang NIU 牛志廣 博士 (Tianjin University 天津大學)

Dr. Niu's research area is optimization and safety of urban water supply systems, and management and planning of water resources. He plans to coordinate a project on the development and application of unmanned surface vehicles for water quality monitoring in Lake Tai.

牛博士的研究領域為城市供水系統安全與優化，水資源與水環境管理與規劃。他計劃開展開發與應用無人船在太湖進行水質監測的項目。

Dr. Lixi ZENG 曾力希 博士 (University of Chinese Academy of Sciences "UCAS" 中國科學院大學)

Dr. Zeng Li-xi plans will carry out research on the analysis of chlorinated paraffins, novel halogenated flame retardants, and other emerging chemicals of concern in wildlife, and studying the transfer and fate of these compounds in aquatic food webs.

曾力希博士計劃開展短鏈氯化石蠟、新興鹵代阻燃劑或其它新出現且備受關注的化學污染物在野生動物中的鑒定和分析，在此基礎上也可以研究和評估這些出現的新興污染物在典型水生食物鏈中的傳遞和歸宿。

A Cooperative Agreement on "Ciguatoxin Immunology, Analytical Chemistry Methods" with Shenzhen University

與深圳大學簽訂《西加毒素免疫學、化學分析方法研究》科研合作協議

The City University of Hong Kong and Shenzhen University have signed a cooperative agreement on "Ciguatoxin Immunology, analytical chemistry methods". This is the first scientific cooperative agreement signed between the members of SMART. Through this partnership, the internal relationship between members will be strengthened. Both sides reached their intention of cooperation and will further explore this as follows. (1) To invite experts to discuss cooperation on radiation monitoring: it intended to invite the Nuclear Technology Research Institute of Shenzhen University and Professors from City University of Hong Kong, such as Prof. Lu Jian, Dean of Department of Science and Engineering; Prof. Yu Kwan Ngok, Department of Physics and Materials Science; and Prof. Cheng Shuk-han, Department of Biology and Chemistry. (2) Owing to there being fewer full-time Marine research institutions in Shenzhen, it is weak in training. It is hoped that the first marine specialist school will be set up with the support of SMART. (3) Because of the short history of Shenzhen University, the Master and Doctor Assessment system has significantly limited the establishment of a doctoral research station, and so causes the loss of outstanding master students. It will be encouraging if the senior management of Shenzhen University and City University of Hong Kong reach an agreement on the joint recruitment of doctoral students. (4) The State Key Laboratory in Marine Pollution, Hong Kong University and Shenzhen Key Laboratory in Marine Biological Resources and Ecological Environment, Shenzhen University will jointly set up a resource library of marine algae germplasm to share the algal resources.

深圳大學與香港城市大學簽訂《西加毒素免疫學、化學分析方法研究》的科研合作協議，這是 SMART 平台上簽訂的首個科研合作協議，通過項目的合作將進一步加强成員院校的內在聯繫。同時達成了以下四個將進一步探討的合作意向：包括 1）邀請深圳大學核技術研究所與香港城市大學科學與工程學院院長呂堅教授、物理與材料科學系余君岳教授、生物及化學系鄭淑嫻教授等在 SMART 的合作平台上商討在核輻射監測等方面的進行合作；2）由於深圳市海洋的專職科研機構與院校少，海洋人才培養力度不足，希望集結 SMART 的平台力量，探討以深圳大學牽頭創辦深圳市首個海洋類特色學院；3）由於深圳大學建校歷史較短，在現行的碩博點評定體制下，大大的局限了學校博士點的成立，導致優秀碩士生源大量流失，因此希望深圳大學與香港城市大學在學校高级管理層的層面可通過聯合招博士生的提議；4）香港城市大學海洋污染國家重點實驗室與深圳大學的深圳市海洋生物資源與生態環境重點實驗室將共建海洋藻類種質資源庫，共享藻種資源。

Social Education & Community Service
公眾教育與社會服務

The Spin Kid Project Phase II & III 哪吒計劃第二及第三期

The second and third phases of the diving training of the Spin Kid Project were successfully held on May and October, 2013. The diving training included participants from Xiamen University, Tsinghua University, City University of Hong Kong, the University of Hong Kong and other organizations. The whole training arrangement was disciplined and strict. The participants not only learned diving skills, but also developed the mental attitude necessary to pursue the ultimate challenge and intimately experience the underwater world.

The diving training covered two days of theoretical courses, one day of indoor diving and two days of open water experience. Trainees learned diving skills, including the installation of the buoyancy compensator device, scuba cylinder fixing, breathing regulator debugging, using integrated instrumentation, and wearing diving clothing.

> ***"There are the thrill of the hustle and bustle above the sea and the fun of silent and non-language under the sea. Diving not only bring gorgeous and amazing experiences to the ocean lovers, but also promote the science research powerfully."***
>
> - Participant of the Spin Kid Project, Zhou Jin

> ***"大海之上有喧囂嬉鬧的快感；大海之下也有無聲非語的樂趣。潛水帶给了海洋人絢爛與神奇，更帶给了科學研究以正能量。"***
>
> -「哪吒計劃」學員之一，周進

二零一三年五月及十份，第二及第三期哪吒計劃潛水培訓活動均圓滿舉行。培訓班由來自廈門大學、清華大學、香港城市大學、香港大學等院校的學員組成。整個培訓課程嚴謹有序，學員們不僅學習了潛水技能，而且鍛鍊了心理意志、接受了追求極限的挑戰以及見證了零距離的海底世界。

此次潛水培訓涵蓋兩天的理論課程，一天的室內潛水和兩天的開放水域體驗。整個培訓課程嚴謹有序，學員們學習了潛水技能，包括浮力調整裝置的安裝。水肺氣瓶的固定。呼吸調節器的調試、綜合儀表的使用以及潛水衣物的配戴。同時學員們面對挑戰時的心理意志得到考驗。

Special thanks to:

1. **Diving Adventure Ltd.**, which provided support for all activities of the Spin Kid Project;
2. **Tai Hing Foods Trading Co., Ltd.**, which sponsored food for the SKLMP Reef Check 2013 event; and
3. Voluntary speakers from the **Agriculture, Fisheries and Conservation Department** and **International Association of Hand-in-Hand Divers (Hong Kong)** for their participantion in public seminars of the Spin Kid Project.

特別鳴謝：

1. **潛水歷險會有限公司**為哪吒計劃所有潛水活動及課程提供的支持；
2. **泰興食品貿易行有限公司**為 SKLMP 2013 年珊瑚普查活動贊助了各種美食；及
3. **香港漁農自然護理署與國際傷健潛水協會（香港）**的講者在哪吒計劃公開講座中義務進行演講。

Student list of the Spin Kid Project (Phase II & III)
哪吒計劃第二期及第三期學員名單

The Spin Kid Project Phase II Open Water Training
哪吒計劃第二期的開放水域訓練

Public Seminar held on 2nd Aug, 2013
2013 年 8 月 2 日舉辦的哪吒計劃公開講座

Phase 期	Certified Diver 受訓潛水員	Qualification^ 潛水資歷	Position (Expertise) 職位 (專業領域)
	City University of Hong Kong 香港城市大學		
II	Johan Zeeck	OW	Exchange Student 交換生
III	Ma Chui Ying, Teresa 馬翠盈	AOW	Research Associate (Ecology and Biodiversity) 研究助理 (生態學和生物多樣性)
III	Mak Yim Ling, Maggie 麥豔玲	AOW	Research Fellow (Analytical Chemistry and Food Safety) 研究員 (分析化學和食品安全)
III	Wu Qian 吳茜	AOW	PhD Student (Analytical Chemistry and Environmental Monitoring) 博士生 (分析化學，環境檢測)
III	Zhang Feng 張峰	AOW	Research Associate (Dinoflagellates) 研究助理 (甲藻)
	The University of Hong Kong 香港大學		
III	Ip Chi Ho, Jack 葉志豪	OW	MPhil Student (transcriptomic & environmental toxicology, imposex) 碩士生 (轉錄組及環境毒理學，性變異)
	The Chinese University of Hong Kong 香港中文大學		
III	Lv Chenwei 呂辰威	OW	Undergraduate Student 本科生
	Tsinghua University, Graduate School at Shenzhen 清華大學深圳研究生院		
II, III	Tao Yi 陶益	AOW	Lecturer (Biomedical and Ocean Optics) 講師 (生物醫學光學和海洋光學)
II	Zhou Jin 周進	OW	Lecturer (Marine Biology) 講師 (海洋生物學)
II	Zhu Xiaoshan 朱小山	DSD	Associate Researcher (Marine Biology) 副研究員 (海洋生物學)
	Xiamen University 廈門大學		
II	Ou Huilong 歐徽龍	OW	Undergraduate Student 本科生

^ OW: Open Water Diving Course; AOW: Advanced Open Water Diving Course; DSD: Discover Scuba Diving

「海洋+」計劃

The Ocean Plus Project

Background and Introduction 成立背景與簡介

The State Key Laboratory in Marine Pollution (SKLMP), City University of Hong Kong, besides working actively at the frontier of marine pollution research has also promoted marine environmental protection and the improvement of marine researchers' skills.

In view of its strong positive response to the Spin Kid Project, SKLMP established a new project in 2013, the Ocean Plus Project. The Ocean Plus Project will connect different kinds of social and interest groups, such as artists, yoga practitioners, bankers, lawyers, teachers, and musicians, with the marine environment by promoting scuba diving education and skills. The project aims to promote marine conservation to society and to stimulate love and respect for the marine environment.

香港城市大學海洋污染國家重點實驗室（SKLMP），除了開展與海洋污染有關的前沿研究外，一直致力於推廣海洋環保理念與提高海洋研究人員的技能水準。

鑒於「哪吒計劃」取得的良好反響，SKLMP 在 2013 年孕育出「海洋+」計劃。「海洋+」計劃將連結各類社會群體，如：「海洋+畫家及藝術家」、「海洋+瑜珈家」、「海洋+銀行家」、「海洋+律師」、「海洋+教師」、「海洋+醫生」、「海洋+會計師」、「海洋+音樂家」等。使公民通過參與「海洋+」計劃，都能夠成為熱愛海洋、尊重海洋的海洋家，從而提升公民的海洋保育意識、推廣海洋文化，使海洋文化發展至社會各階層。

Participant List of the Ocean Plus Project
海洋+計劃的參加者名單

Certified Diver 受訓潛水員	Qualification^ 潛水資歷	Position (Expertise) 職位 (專業領域)
City University of Hong Kong 香港城市大學		
Chan Julyanna	OW	Supervisory Executive Officer 監督行政主任
Chen Ziguang 陳子光	OW	Professor (Organizational Behavior and Human Resource Issues) 教授 (組織行為及人力資源事務)
Jiang Chan 蔣嬋	DSD	Chief Operating Officer 營運總監
Kwok Ying, Karen 郭盈	AOW	Chemist 化學分析師
Mak Yiu Pan, Ben 麥耀彬	AOW	Environmental Administrator 環境管理員
Xue Quan 薛泉	OW	Associate Vice President, Professor (Wireless Communications, Microwave and RF Circuit and Subsystems, Millimeter-wave Techniques, Microwave Monolithic Integrated Circuits, and Antennas) 協理副校長、教授 (無線通訊、微波和射頻電路和子系統,毫米波技術,微波單片積體電路和天線)
Tsinghua University, Graduate School at Shenzhen 清華大學深圳研究生院		
Cai Zhonghua 蔡中華	AOW	Vice Director of Marine Science & Technology Center Research Office (Marine Ecotoxicological and Microbiological Regulation Processes) 海洋科學與技術中心副主任 (海洋生態毒理以及微生物對海洋生態的調節過程)
Ma Hui 馬輝	AOW	Vice President (Biomedical and Ocean Optics) 副院長 (生物醫學光學和海洋光學)
Mao Xianzhong 毛獻忠	OW	Associate Professor (Environmental Fluid Mechanics; Hydrodynamics; Water Quality Modeling; Water Environmental Disaster Simulation) 副教授 (環境流體力學、河口水動力計算、水質模型、水環境災害)
Xiamen University 廈門大學		
Chen Jixin 陳紀新	OW	Senior Engineer (Marine Phytoplankton) 高級工程師 (海洋浮游植物)
Chen Jun 陳軍	OW	Associate Professor (Transcriptom and Molecular Genetics of Marine Organism) 副教授 (海洋生物轉錄組學和分子遺傳學)
Luo Lianzhong 羅聯忠	OW	Associate Professor (Proteomics) 副教授 (蛋白組學)
Wang Dexiang 王德祥	OW	Associate Professor (Genetic Diversity of Marine Organism, Evolution of Benthic Invertebrates, Fertilization and Development in Abalone, Deep-sea Biology and Oceanographic Instrumentation) 副教授 (海洋有機物的基因多樣性，底棲無脊椎動物的進化，鮑魚的受精和發育，深海生物學和海洋儀器研發)

Government Officer 政府官員		
Chen Haiyuan 陳海遠	DSD	Zhuhai City Environmental Protection Bureau, Deputy Director 珠海市環境保護局副局長
Liu Yiping 劉一平	DSD	Science, Technology and Innovation Commission of Shenzhen Municipality, Deputy Division Director 深圳市科技創新委員會副處長
Zhang Aimin 張愛民	AOW	Science, Technology and Innovation Commission of Shenzhen Municipality, Deputy Division Director 深圳市科技創新委員會副處長
General Public 市民大眾		
Jiang Qingbei 蔣慶北	DSD	Painter 畫家
Kwan Chi Wan 關志雲	DSD	Karateka of the University of Hong Kong 香港大學空手道學員
Kwong Yu Wai 鄺于惠	DSD	Karateka of the University of Hong Kong 香港大學空手道學員
Man Yuen Yee 文婉怡	DSD	Karateka of the University of Hong Kong 香港大學空手道教練
Pong Ka Leung 龐家樑	DSD	Karateka of the University of Hong Kong 香港大學空手道學員

^ OW: Open Water Diving Course; AOW: Advanced Open Water Diving Course; DSD: Discover Scuba Diving

Hong Kong Reef Check 2013

中華潛龍隊參加 2013 年香港珊瑚普查活動

On 10 September 2013, the SKLMP Dive Team participated in the Hong Kong Reef Check 2013 under the organization of Dr WAI Tak Cheung. The Hong Kong Government has organized the Reef Check for over 15 years, since 1997. Volunteers are actively involved in this meaningful activity, and the data collected from different reef check teams are important for developing policies to protect the coral reef system. Prof. Lam, Dr Leo Chan and other colleagues attended the activity.

On the same day, colleagues who are scuba diving instructors led others to experience scuba diving, swimming in the amazing seaworld and enjoying the beautiful sea. We hope that we contributed to the protection of the marine environment through our participation in this activity.

2013年9月10日，我室韋德祥博士組織中華潛龍隊參加2013年珊瑚礁普查，在西貢指定海域採集數據。香港珊瑚礁普查計劃從1997年展開以來，每年都招募義工參與，瞭解香港水域內的珊瑚穩定性並收集資料，以協助制定相關的保育政策。實驗室主任林群聲教授，副主任陳荔及相關同事和熱心人士參與到此次活動。

與此同時，我室已有潛水教練執照的同事還熱心指導和帶領有興趣的參與者進行潛水體驗，一同暢遊在海底，領略海洋的美麗神奇。我們希望通過參與這項活動，為海洋環境保護貢獻綿薄之力。

The First Blue Star Young Leader Summer Camp

第一屆藍星青年領袖夏令營

To cultivate the younger generation's interests in the ocean, the first Blue Star Young Leader Summer Camp was held successfully in Shenzhen. This was proposed by Dr. Leo Chan from the SKLMP and promoted by Mr. Lu Jiancheng, the Vice Director of Shenzhen Institute of Advanced Technology, Chinese Academy of Science; Prof. Hu Min from Peking University; Prof. Cai Zhonghua from Tsinghua University Shenzhen Graduate School; Eileen from the University of Washington; and Prof. Tan Qinliang from the North China Electric Power University. Ten outstanding high school graduates and college students from home and abroad gathered in Shenzhen and participated in the two day culture and art tour.

On 19 and 20 July, the young leaders visited Shenzhen Book City and the creative shops around, mainly touring the Dafen Art Village and the OCT-Loft under the guidance of the famous artist Mr. Jiang Qingbei. They also participated in a handicraft class, where the contemporary young painter Miss Cai Lulu taught them to prepare their own unique work of art. The youngsters helped each other and had open and candid communication on this journey, and it promoted friendship between them.

The Blue Star Young Leader Summer Camp is the previous generation's gift for the younger generation. Through organizing rich and colorful forms of beneficial activities, this camp aims to provide a platform for exchange and communication, to continue life-long friendships and to grow together.

為培育青年一代對海洋的熱愛，由香港城市大學海洋污染國家重點實驗室陳荔博士宣導，在中國科學院深圳先進技術研究院副院長呂建成、北京大學胡敏教授、清華大學深圳研究生院蔡中華教授、華盛頓大學祈慧玲女士、華北電力大學檀勤良教授等老師的大力支持和幫助下，第一屆藍星青年領袖夏令營活動順利開展。來自海內外的優秀高中畢業生和大學生齊聚深圳，共同參與了這次為期兩天的文化藝術之旅。

7 月 19 和 20 日，青年領袖們在領隊和蔣慶北藝術家的帶領下參觀了書香氣息濃重的深圳書城中心城及周邊的藝術創意小店，重點遊覽了以油畫為文化產業品牌的大芬油畫村和融“創意、設計、藝術”於一身的華僑城創意文化園，並在中國當代青年繪畫藝術家蔡露露老師的講解和指導下，親自動手完成趣味藝術飾品的製作。大家在這次旅程中相互協助、傾心交談，增進了彼此間的友誼。

藍星青年領袖夏令營活動是上一代海洋人為下一代海洋人準備的禮物，旨在通過組織豐富多彩、形式多樣的有益活動，為下一代青年朋友們提供交流和溝通的平台，延續友誼，共同成長。

Chinachem Walkathon 華懋慈善行 2013

On 3 November, our directors, colleagues and students formed a team to join the Chinachem Walkathon 2013 organized by the Chinachem Group for the second year. The team finished a 2km route around the Tai Tam Reservoir, enjoying the magnificent scene of the dams. Besides exposing ourselves into the greatness of nature to take a half-day break, all the funds raised went to the beneficiary – the Sai Kung District Community Centre in support of the "Green Life Education Project". The project supports children from grass root families enjoying the geopark tour to Ma Shi Chau, giving our next generation a chance to understand the geologic gift of our local surroundings. Eventually, this meaningful project could encourage them to protect and cherish Hong Kong's natural environment, matching one of the SKLMP's social responsibility – Public Education.

11 月 3 日，我室兩位主任連同一眾同事及學生第二年參加由華懋集團舉辦的「華懋行」活動。一行人一起走畢大潭水塘兩公里多的路線，欣賞了沿途水壩的風光。大家除了能投身大自然，享受半天的悠閒外，今年的受惠機構西貢社區中心，會將所籌得之善款用於資助基層家庭的小朋友參加馬屎洲地質導賞團。這與我室的社會責任 - 開展「公眾教育」的理念不謀而合，讓我們下一代了解到本地的資料寶藏，從而令他們日後好好保護及珍惜香港的天然環境。

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